GREEN RIVER LOCKS AND DAMS 3, 4, 5 AND 6 AND BARREN RIVER LOCK AND DAM 1, KENTUCKY

COMMUNICATION

FROM

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

TRANSMITTING

THE GREEN RIVER LOCKS AND DAMS 3, 4, 5 AND 6 AND BARREN RIVER LOCK AND DAM 1, KENTUCKY DISPOSITION FEASIBILITY STUDY FOR JULY 2016, PURSUANT TO 33 U.S.C. 549a; PUBLIC LAW 91–611, SEC. 216; (84 STAT. 1830)



JULY 18, 2016.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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

30 JUN 2016

Honorable Paul Ryan
Speaker of the House of Representatives
U.S. Capitol Building, Room H-232
Washington, DC 20515

Dear Mr. Speaker:

In accordance with section 216 of the Flood Control Act of 1970 (P.L. 91-611) which authorizes investigations for modification of completed projects or their operation when found advisable due to significantly changed physical or economic conditions and for improving the quality of the environment in the overall public interest, the Secretary of the Army supports the deauthorization of Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. The proposed deauthorization is described in the report of the Chief of Engineers, dated April 30, 2015. A copy of the report and other supporting data are enclosed.

Locks and Dams 1, 2, 3, and 4 on the Green River and Lock and Dam 1 on the Barren River were built by the Commonwealth of Kentucky prior to 1886 and purchased by the U. S. Government under authorization of the River and Harbor Act of 1888. The U.S. Army Corps of Engineers (Corps) made facilities at Green River Lock and Dam 5 and Green River Lock and Dam 6 operational in 1900 and 1906, respectively. The Corps modified and improved the system to provide slack water navigation from the mouth to the city of Bowling Green at mile 30 on Barren River. Green River Lock and Dam 4 failed in 1965, and commercial navigation has not occurred upstream of it since that time. The operation of Green River Lock and Dam 3 ceased in 1981 due to a lack of traffic. Since their closures, the facilities have been maintained by the Corps in a caretaker status. Green River Locks and Dams 1 and 2 are still operational.

Following deauthorization of commercial navigation at these facilities, the Corps will dispose of these properties and facilities through existing Army regulations and General Services Administration procedures, unless Congress provides specific disposal authority. The Corps will address public safety concerns, which primarily relate to the risk of injuries associated with unauthorized entry to the properties to be deauthorized, by installing barricades on miter gates, as well as updating signage at each site.

An Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act. No compensatory mitigation is required. Adverse environmental impacts have been avoided and minimized where practicable. The EA resulted in a Finding of No Significant Impact to the environment, therefore, preparation

of an Environmental Impact Statement is not required.

The Office of Management and Budget (OMB) advises that there is no objection to the submission of the report to Congress and concludes that the report recommendation is consistent with the policy and programs of the President. A copy of OMB's letter, dated June 28, 2016, is enclosed. I am providing a copy of this transmittal and the OMB letter to the Subcommittee on Water Resources and Environment of the House Committee on Transportation and Infrastructure, and the Subcommittee on Energy and Water Development of the House Committee on Appropriations. I am also providing an identical letter to the President of the Senate.

Very truly yours,

Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

Enclosures

Enclosures

1. OMB Clearance Letter
2. Report of the Chief of Engineers, April 30, 2015
3. Final Feasibility Report and Environmental Assessment, August 2014

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

June 28, 2016

The Honorable Jo-Ellen Darcy
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, DC 20310-0108

Dear Ms. Darcy:

As required by Executive Order 12322, the Office of Management and Budget has reviewed an August 2014 Army Corps of Engineers feasibility report (report) that proposes deauthorization of Green River Lock and Dam 3, Green River Lock and Dam 4, Green River Lock and Dam 5, Green River Lock and Dam 6, and Barren River Lock and Dam 1.

We have concluded that the recommendations in the report are consistent with the policy and programs of the President, subject to a viable plan for disposing or transferring ownership of each of the projects. The Office of Management and Budget does not object to your submitting this report to Congress.

Sincerely,

John Pasquantino
Deputy Associate Director
Energy, Science, and Water

ENCL 1

DEPARTMENT OF THE ARMY
CHIEF OF ENGINEERS
2600 ARMY PENTAGON
WASHINGTON, DC 20310-2600

APR 30 2015

DAEN

SUBJECT: Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1, Kentucky

THE SECRETARY OF THE ARMY

1. I submit for transmission to the Congress my report on the deauthorization of unused navigation facilities on the Green and Barren Rivers in Kentucky. It is accompanied by the reports of district and division engineers. These reports respond to Section 216 of the River and Harbor and Flood Control Act of 1970 (P.L. 91-611) which authorizes investigations for modification of completed projects or their operation when found advisable due to significantly changed physical or economic conditions and for improving the quality of the environment in the overall public interest.

2. The reporting officers recommend that the Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 be deauthorized for the purpose of commercial navigation. Locks and Dams 1, 2, 3, and 4 on the Green River and Lock and Dam 1 on the Barren River were built by the Commonwealth of Kentucky prior to 1886 and purchased by the U. S. Government under authorization of the River and Harbor Act of 11 August 1888. The U.S. Army Corps of Engineers (USACE) made facilities at Green River Lock and Dam 5 and Green River Lock and Dam 6 operational in 1900 and 1906, respectively. USACE modified and improved the system to provide slack water navigation from the mouth to the city of Bowling Green at mile 30 on Barren River. Green River Lock and Dam 4 failed in 1965, and commercial navigation has not occurred upstream of it since that time. The operation of Green River Lock and Dam 3 ceased in 1981 due to a lack of traffic. Since their closures, the facilities have been maintained by USACE in a caretaker status. Green River Locks and Dams 1 and 2 are still operational.

3. The recommended plan is to deauthorize commercial navigation at Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1. Following deauthorization of commercial navigation at these facilities, USACE will dispose of these properties and facilities through existing Army regulations and General Services Administration procedures, unless Congress provides specific disposal authority. USACE will address public safety concerns, which primarily relate to the risk of injuries associated with unauthorized entry to the properties to be deauthorized, by installing barricades on miter gates, as well as updating signage at each site. This maintenance work will be funded through the established operation and maintenance budget process.

4. The recommended plan minimizes adverse social impacts, causes no further negative environmental impacts and facilitates future disposal of the properties in the most efficient manner. Coordination under Section 7 of the Endangered Species Act of 1973 is concluded.

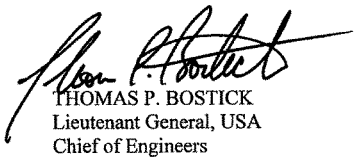
ENCL 2

DAEN
SUBJECT: Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1, Kentucky

Though not required as a part of the recommended plan, consultation under Section 106 of the National Historic Preservation Act of 1966, as amended, will be required in conjunction with any future disposal action. There may be minimal activities and costs associated with care and custody as well as real estate administrative costs until the real property disposal is complete.

5. I concur with the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that the Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 be deauthorized in accordance with the reporting officers' recommended plan.

6. The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program nor the perspective of higher review levels within the executive branch. Consequently, the recommendations may be modified before they are transmitted to the Congress. However, prior to transmittal to Congress, interested states, federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.



THOMAS P. BOSTICK
Lieutenant General, USA
Chief of Engineers

Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study, Kentucky



US Army Corps of Engineers.

August 2014
Main Report

Executive Summary

Green River Locks and Dams 3 through 6 and Barren River Lock and Dam 1 were authorized by Congress for navigation, but are no longer in use. The facilities and the pools are no longer operated for navigation purposes by the U.S. Army Corps of Engineers (USACE); however, the U.S Army still has administrative accountability of the properties, and USACE periodically inspects the facilities.

The Green River Locks and Dams 5 and 6 ceased operations in 1951 due to a marked decline in navigation traffic, coupled with increasing operation and maintenance costs. In May 1965, Green River Dam 4 failed, which resulted in the closure of Green River Lock and Dam 4 and also Barren River Lock and Dam 1, as navigation beyond that lock and dam was no longer possible. Green River Lock and Dam 3 remained in operation until 1981 when it was closed due to declining boat traffic.

Since the failure of Green River Dam 4, USACE has conducted multiple investigations concerning the feasibility of restoring navigation to the Upper Green River System. These studies have consistently found that the economic benefits from commercial navigation operations would be insufficient to support restoring navigation. In 2004, the USACE conducted a study to assess the impacts of deauthorization of the Green River Locks and Dams 3 - 6 and Barren River Lock and Dam 1 and relinquishment of the federal government's interest in the property and facilities; the study also contained recommendations concerning construction and disposal alternatives. No action was taken at that time with respect to the study's recommendations; therefore, the USACE maintains the properties in a caretaker status.

The purpose of this study is to update the analysis and recommendations of the 2004 study regarding the possible deauthorization and relinquishment of federal control of the facilities. The 1993 study (study focused on improvements to the existing facilities located at Lock and Dam 3 at Rochester, Kentucky), 2004 study and this reevaluation were accomplished under the original authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-611). This is a general authority for the Secretary of the Army to review completed projects, when found advisable due to changed physical, economic or environmental conditions. This study also supports the objectives of the 10 June 2010 Presidential Memorandum 'Disposing of Unneeded Federal Real Estate' and Section 6002 of the Water Resources Reform and Development Act of 2014, which requires the Secretary of the Army to identify property that is excess to project needs and to notify and work with the General Services Administration for the disposal of all excess property.

This study reevaluated current uses of the facilities, including the pools formed by the dams and the impacts if the pool were to be lost, either by demolition or failure of the lock and/or dam. The study reassessed the condition and safety of the structures. Finally, the study discussed alternative means to potentially dispose of the facilities in the future following deauthorization of the navigation purpose, as well as potential entities interested in owning the facilities.

Four alternatives for deauthorization and possible disposition were evaluated for each site:

1. **Alternative 1 (No action)**. All locks and dams would remain in federal ownership in caretaker status. The USACE would remain responsible for the facilities.
2. **Alternative 2 (Congressional Deauthorization Only)**. Only request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1.
3. **Alternative 3 (Deauthorization, Dam Removal, Lock Fill and Installation of Warning Signs)**. Request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. Dispose of the properties after the dams are removed and the lock

chambers are filled with materials from the demolition of the dam. Excess dam materials would be disposed of onsite along the lock approaches or in an approved offsite location. Three warning signs would be equally spaced and installed on the lock side chamber walls.

4. **Alternative 4 (Deauthorization, Lock Stabilization, Installation of Barricade and Warning Signs).** Request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. Dispose of the properties after the locks are modified (for example, by constructing a bulkhead) to ensure stability and pool retention before disposal. To impede access to the river side lock wall, the land side miter gates would be barricaded. Three warning signs would be equally spaced and installed on the lock side chamber walls.

The recommended plan (Alternative 2) is to only request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. There are no costs associated with the recommended plan.

In accordance with ER 200-2-2, the project as proposed, is in compliance with the National Environmental Policy Act (NEPA) and all other applicable laws and regulations governing environmental and cultural resources. An Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) along with the Study were circulated for a 30-day public and agency review (see Appendix D for additional detail). The EA and comments from the public and state and Federal resource agencies supported a finding of no adverse impacts from implementing the recommended alternative.

Following Congressional deauthorization of commercial navigation at these facilities, a logical next step would be to seek disposal of these properties and facilities through the established USACE and GSA procedures as outlined in the Federal Property and Administrative Services Act of 1949 and Army regulations. The safety concerns identified at Green River Locks and Dams 3 through 6 and at Barren River Lock and Dam 1 would be addressed at each site by installing barricades on miter gates, as well as updating signage at the sites. This maintenance work would be funded through the established Operation and Maintenance budget process.

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1 Introduction

The purpose of this study is to evaluate the condition and use of existing navigation facilities located on the Green and Barren Rivers between Brownsville, Kentucky and Rochester, Kentucky on the Green River, and at Greencastle, Kentucky on the Barren River. These facilities include Locks and Dams 3, 4, 5, and 6 on the Green River and Lock and Dam 1 on the Barren River. These facilities are the focus of this study because they are no longer used for navigation. (There are two other navigation facilities on the Green River. Lock and Dam 1 near Spotsville, Kentucky and Lock and Dam 2 at Calhoun, Kentucky are still used for commercial navigation. This study does not include these two locks and dams.) This study would be used to make recommendations regarding the deauthorization of the facilities and identifies actions the USACE will take using established USACE authorities and operation and maintenance (O&M) budget process. The study could also serve as a foundation for future actions considering disposal of the facilities. This study serves as the decision document supporting the Chief's Report to Congress requesting such deauthorization. Upon a favorable finding regarding deauthorization of the facilities, the sites could then be considered for disposal at a future time in accordance with the Federal Property and Administrative Services Act of 1949 and Army regulations.

2 Study Authority and History

This study was authorized by Section 216 of the Flood Control Act of 1970 (P.L. 91-611), which is a general authority for the Secretary of the Army to review completed projects due to changed physical, economic or environmental conditions.

This effort was initially funded as part of the Fiscal Year 1995 Energy and Water Resource Appropriation Bill, and the resulting study found that there would be insufficient benefits from commercial navigation operations to support restoration of navigation. Currently, the U.S. Army Corps of Engineers (USACE) maintains the properties in a caretaker status.

2.1Recent History Leading to the 2014 Disposition Study

1991	Green and Barren Rivers Navigation Study (Reconnaissance) determined there were only benefits for restoring L&D 3
1993	Feasibility Study for Navigation Improvements to the Green River: Concluded that there were insufficient benefits from commercial navigation to support any improvement to the system
1998-2000	Phase 1 cultural resources examination conducted of property associated with L&Ds 3, 4, 5, and 6 along the Green River and L&D 1 on the Barren River
2000	Environmental Baseline Survey completed
2004	Submitted completed disposition study through MSC to HQ Office of Water Project Review (OWPR)
2004-2005	Disposition Study released for state and agency review
2007	HQUSACE was ready to prepare Chief's Report to submit to ASA-CW, subject to verification of completed state & agency review; no action taken
2007-2008	Local and Congressional interest in L&D 3 regarding water supply issues unrelated to navigation authorization
2008	Response from HQUSACE to Louisville District that the 2004 report requires updating
2009-2010	ARRA funding received to complete an engineering analysis at L&D 3
2013	Funding received to update the 2004 Disposition Study

In 1998, a Phase 1 cultural resources examination was undertaken of property associated with Locks and Dams 3, 4, 5, and 6 along the Green River and Lock and Dam 1 on the Barren River in south-central Kentucky. No evidence of either prehistoric or undisturbed historic-era remains was encountered and no further archaeological studies are recommended on these parcels. The locks and dams themselves are considered eligible for the National Register of Historic Places (NRHP) and the required level of documentation needed on these navigation facilities remains to be coordinated with the Kentucky State Historic Preservation Officer (KY-SHPO).

To date, the USACE has completed a brief historical overview of the Green and Barren Navigation System and prepared archival quality photo documentation of all existing structures. A report containing this information was completed in July 2000.

Additionally, an environmental baseline survey (EBS) was performed in February 2000 to determine the possibility that the sites have been contaminated by HTRW; or, that the potential exists for contamination by such materials. Some indications of the presence, or potential presence, of hazardous or toxic materials were noted at almost all of the properties surveyed during the EBS. However, based on the information reviewed and physical observations, there is no evidence that significant amounts of hazardous materials were ever stored, handled, transported, disposed or otherwise released at any of the locks and dams within the study area.

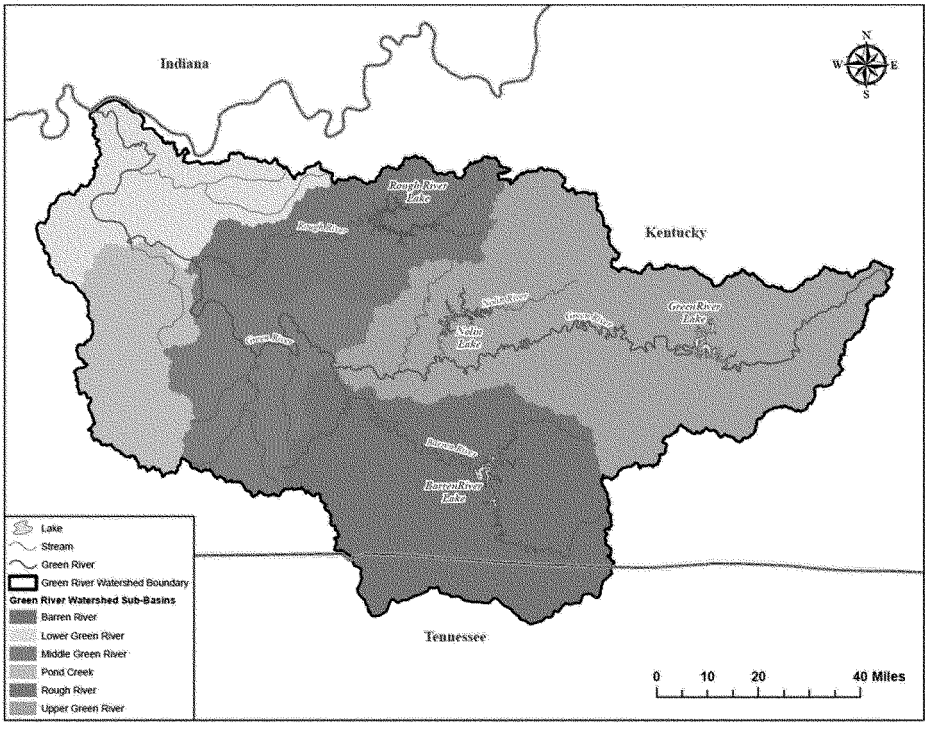
A feasibility study was performed in 2004 that recommended deauthorization and disposal of Green River Locks and Dams 3 - 6 and Barren River Lock and Dam 1. The recommended alternative consisted of demolishing the dam at Green River Lock and Dam 6 (which would restore 6 - 8 miles of the Green River to its natural conditions at Mammoth Cave) and filling the lock chambers at Green River Locks and Dams 3-5 and Barren River Lock and Dam 1.

A decision on how to proceed with the recommendations in the 2004 feasibility study was not reached until 2008, and project funding was not available until 2013. In the intervening 10 years since the study was complete, changes have taken place. Therefore, it is necessary to update the existing conditions at each lock and dam, recommended plan, cost estimates, the prior analysis conducted to ensure compliance with the National Environmental Policy Act (NEPA), public coordination and study reviews. The Review Plan for this study was approved on 22 October 2013, and the Independent External Peer Review Exclusion Request was approved on 18 December 2013.

3 Study Area

The Green River Basin has a drainage area of 9230 square miles and stretches from west-central Kentucky into north-central Tennessee. Basin topography varies from gently rolling in the east to the moderately rugged Western Kentucky coalfields regions and then into a broad floodplain as the river enters the Ohio River just upstream of Henderson, Kentucky. Major tributaries include the Barren, Rough and Nolin rivers. See Plate 1.

Figure 3.a: Green River Watershed



4 USACE Projects in the Basin

Water resource development in the Green River Basin area consists of the navigation system as well as four multipurpose reservoirs and six local flood risk management projects. These are discussed in Sections 4.3 and 4.4.

4.1 Navigation System

The navigation system consists of six structures located on the Green and one structure each on the Barren and Rough rivers. Locks and Dams 1 to 4 on the Green River and Lock and Dam 1 on the Barren River were built by the Commonwealth of Kentucky prior to 1886 and purchased by the U. S. Government under authorization of the River and Harbor Act of 11 August 1888. Green River Lock and Dam 6 was constructed in 1906 and Lock and Dam 5 followed in 1934. The system was modified and improved by the United States to provide slack water navigation from the mouth to Bowling Green at mile 30 on Barren River and mile 8 on Nolin River.

4.1Pertinent Data for the Green and Barren Rivers Locks and Dams

L&D No.	year built	mi above mouth	width	length	lift	upper	lower
Green 1	1956	9.1	84.0	600.0	11.8	349.1	337.3
Green 2	1956	63.1	84.0	600.0	14.0	363.1	349.1
Green 3	1836	108.5	35.8	137.5	17.3	380.4	363.1
Green 4	1839	149.0	35.8	138.0	16.4	396.8	380.4
Green 5	1934	168.1	56.0	360.0	15.2	412.0	396.8
Green 6	1906	181.7	36.0	145.0	9.2	421.2	4112.0
Barren 1	1934	15.0	56.0	360.0	15.2	412.0	396.8

The Lock and Dam Projects are all located in Kentucky; approximate locations (shown on Figure 4.a) are as follows:

- Green River Lock and Dam 1: Spotsville, Henderson County, Green River mile 9.1.
- Green River Lock and Dam 2: Calhoun, McLean County at Green River mile 63.1.
- Green River Lock and Dam 3: near Rochester, in Ohio and Muhlenberg Counties at Green River mile 108.5.
- Green River Lock and Dam 4: Woodbury, Butler County at Green River mile 149.0.
- Green River Lock and Dam 5: Butler and Warren Counties at Green River mile 168.1.
- Green River Lock and Dam 6: Brownsville, Edmonson County at Green River mile 181.7.
- Barren River Lock and Dam 1: near Greencastle in Warren County at Barren River mile 15.0.

Green River Lock and Dam 1 near Spottsville, Kentucky and Lock and Dam 2 at Calhoun, Kentucky are still used for commercial navigation; this study does not include these two locks and dams.

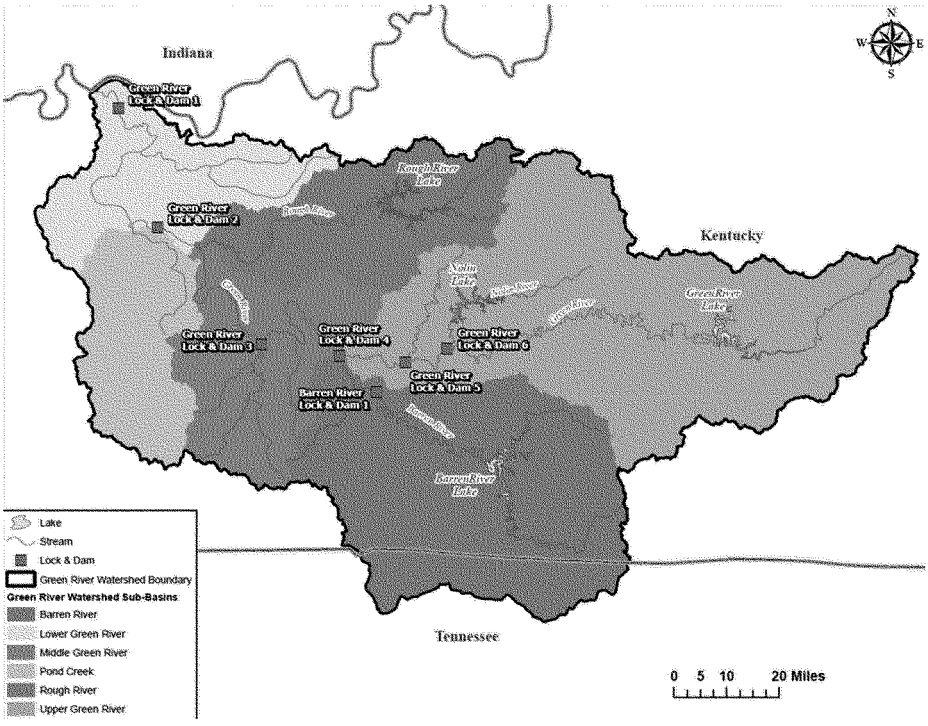
4.2 Multipurpose Reservoirs

The primary purpose of the Green River Basin reservoirs (shown on Figure 4.a) is managing flood waters; however, they are also used for recreation, water supply and managing natural resources. These multipurpose projects are integral units in the system for flood risk management for the Ohio and Mississippi rivers. Estimated damages prevented by the completed projects exceed $200 million since their completion. Communities along the banks of the Green River are afforded significantly lower annual flood risk by the four reservoirs in the upper basin.

The multipurpose reservoir system consists of the following projects:

- Barren River Lake: Allen, Barren and Monroe Counties, Kentucky, on the Barren River.
- Green River Lake: Taylor, Adair and Casey Counties, Kentucky on the Green River.
- Nolin Lake: Edmonson, Grayson, Hardin and Hart Counties, Kentucky, on the Nolin River.
- Rough River Lake: Breckinridge, Grayson and Hardin Counties, Kentucky, on the Rough River.

Figure 4.a: Green River Watershed Navigation and Multipurpose Reservoir Locations



4.3 Flood Risk Management Projects

The Rough River and Barnett Creek Channel Improvements were authorized by the Flood Control Act of 1944. Work consisted of approximately 9 miles of clearing the channel and the banks of the lower 64 miles of the river. The project was turned over to local authorities for O&M in July 1961.

4.4 Continuing Authorities Projects

Congress has provided nine legislative authorities under which the Secretary of the Army, acting through the Chief of Engineers, is authorized to plan, design and construct certain types of water resource projects without additional and specific Congressional authorization. These authorities are called the Continuing Authorities Program (CAP) when referred to as a group. The authorities are for specific purposes. Continuing Authority Projects in the study area are as listed:

- Cypress Creek Channel Clearing (§[1]208). Under the authority of §208 of the Flood Control Act of 1954, the USACE may study and construct in-stream clearing and snagging projects to reduce damage caused by

[1] The § symbol is shorthand for "section"; §205 is equivalent to "section 205".

overbank flooding. The Cypress Creek project consisted of clearing an average 120-foot minimum width from the mouth of Cypress Creek to Pond River mile 18.4. The project was completed in November 1963.

- Panther Creek Channel Clearing and Cleaning (§205). Under the authority of §205 of the Flood Control Act of 1948, the USACE may study and construct works to manage the risk posed by overbank flooding. The Panther Creek project was completed in 1968 and consisted of clearing and snagging the channel and constructing a berm on each side averaging 20 feet in width from the mouth upstream to the confluence of the two forks at mile 22.6, upstream 13 miles on the North Fork and upstream 10 miles on the South Fork.
- Green River-Calhoun-Streambank Erosion (§14): Section 14 of the Flood Control Act of 1946 provides authority to stabilize riverbank erosion where that erosion threatens public facilities. Two separate §14 projects were completed in this area. Both projects are located on the right bank of the Green River at Calhoun, just upstream of Green River Lock and Dam 2. The first involved placing riprap on the bank to protect a sewer line. The second project was upstream of the first, and consisted of placing riprap on the bank to protect the City of Calhoun's municipal water intake. The projects were completed in 1994.
- Green River Handy Riparian Restoration Project (§1135) Under the authority of §1135 (b) of WRDA 1986, USACE may plan, design and build modifications to existing USACE projects, or areas degraded by USACE projects for the purpose of restoring aquatic habitats for fish and wildlife. Green River Lake eliminated out-of-bank flooding in the project area. Prior to impoundment, the project area experienced out-of-bank flooding with each 5-year storm event. Today, out-of-bank flooding occurs only with an approximate 100-year event. In the thirty plus years of Green River Lake's existence, there has been no flooding of the bottomlands. This severely restricts natural recruitment and reforestation, as floods are the primary method of seed dispersal for many bottomland hardwood trees. Without this regeneration the riverbanks have lost natural protection against wind and wave action, runoff and other factors contributing to erosion. To restore this natural process, approximately 800 linear feet of riverbank was stabilized using a combination of plantings, rock protection and two bend way weirs. These weirs were specifically designed for this location to intercept flow from Russell Creek and redirect it toward the middle of Green River. The project was completed in 2003.

5 Prior Studies and Reports

- 1953 Survey Report - A review of prior reports titled, Review of Prior Reports on Green and Barren Rivers. Kentucky for Navigation, recommended modernization of the lower 103 miles of the Green River consisting of (a) reconstruction of Lock and Dam 2, (b) reconstruction of Dam 2, (c) partial rehabilitation of Dam 1, (d) widening the channel to 200 feet and deepening it to 9 feet, and (e) the provision of guide fenders and cells at restricted bridge openings. As a result of this favorable report, the lower river modernization was authorized and construction completed in 1956.
- 1960's Studies – USACE undertook a review of the Green River Navigation System pursuant to study authorities provided by resolution of Committee on Public Works of the United States Senate and House of Representatives. Multiple studies investigated alternatives for replacing and modernizing Green River Locks and Dams 3, 4, and 5; and Barren River 1 including the provision for a 9-foot depth channel. Constructing a multipurpose reservoir near Rochester, Kentucky was also considered. Estimated benefit/cost ratios ranged from 0.54 to 1.0 and significant opposition to the proposed Rochester Lake developed. Commodity and market studies conducted during this time frame included a coal market study by the Paul Weir Company of Chicago, Illinois with stages 1 and 2 of the study completed in 1966; and studies conducted by the Battle Memorial Institute of Columbus, Ohio, which addressed primarily commodities other than coal.
- Failure of Dam 4 - On 24 May 1965, Dam 4 on the Green River failed. In July 1965, a report on the failure was completed which concluded that insufficient economic justification existed to repair the dam.
- Rehabilitation of Dam 1 - A 1968 Report of Rehabilitation of Dam 1 on the Green River recommended that USACE construct a new concrete filled cellular sheet pile dam just downstream of the existing structure. The work was completed in 1970.
- Green and Barren River Environmental Impact Statement - Completed in December 1975, the Final Environmental Impact Statement, Continued O&M, Green and Barren Rivers, Kentucky was completed pursuant to the National Environmental Policy Act of 1969.
- 1978 Preliminary Feasibility Report, Green and Barren Rivers, Kentucky - This study investigated numerous alternatives for restoring navigation to the Upper Green River System, including the previously considered Rochester Lake Alternative. The alternatives in this study were found to be marginally beneficial; therefore, the study was terminated.
- 1990 Reconnaissance Study, Green and Barren Rivers Navigation – This reconnaissance study was completed in March 1990 and focused on reestablishing nine-foot draft navigation to Bowling Green, Kentucky by replacing Lock and Dam 3 at Rochester, Lock and Dam 4 at Woodbury and renovating Lock and Dam 1 on the Barren River to reach Bowling Green with four barge tows. Navigation-only and multipurpose lake projects with navigation were evaluated. The reconnaissance study concluded that replacement of Lock and Dam 3 at Rochester was the only potentially economically feasible alternative.
- 1993 Feasibility Study for Navigation Improvements to the Green River - This study focused on improvements to the existing facilities located at Lock and Dam 3 at Rochester, Kentucky. The study found that there were insufficient benefits from commercial navigation to support any type of improvement.
- 1994 Green and Barren Rivers Flood Control Reconnaissance Study - This screening level study effort was conducted to determine any possible candidate sites for further study under the Continuing Authority Program. No sites were identified.
- 1995 - Green River - McLean County Kentucky Reconnaissance Study - This study evaluated flooding within McLean County, Kentucky and its county seat located at Calhoun. No structural improvements were identified, but the study did produce additional flood and stream data and new floodplain mapping. The

referenced data was provided to the local sponsor (Office of the McLean County Judge Executive) in the form of a Geographical Information System (GIS) database.

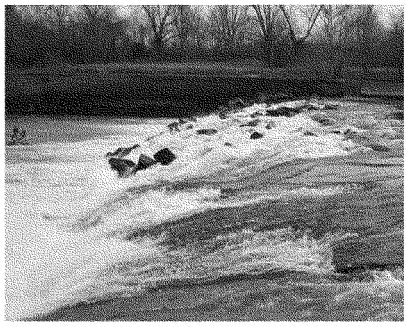
- 2000 Green River Lake Reoperation (MOU between The Nature Conservancy (TNC) and USACE) - Green River Lake Reoperation became the first USACE project to receive approval for permanent operation for ecological benefits downstream of a USACE reservoir as part of the Sustainable Rivers Project (SRP), a joint effort of USACE and TNC. The SRP is executed under a Memorandum of Understanding (MOU) between USACE and TNC signed in 2000, and was sparked by an initial collaboration to restore native biodiversity of the Green River by changing the water release schedule for Green River Dam. In 2002, USACE began a three-year trial period of reoperating the Dam to mimic natural conditions; the reoperation was made permanent in 2005.
- 2004 Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Navigation Disposition Study - The study evaluated current uses of the pools formed by these dams and the impacts on those uses if the pool were to be lost, either through demolition or failure of the lock and/or dam. The study assessed the condition and safety of the structures. The recommended plan was to deauthorize all the projects and dispose of the properties after recommended construction is completed at each sites. The recommended construction consisted of demolishing the dam at Green River Lock and Dam 6 and filling the lock chambers at Green River Lock and Dams 3 - 6 and Barren Lock and Dam 1 with engineered stone.
- 2011 Green River Lock and Dam 3 (Rochester Dam) - Rochester Dam was found in several previous studies to no longer fulfill the authorized purpose of commercial navigation on the Green River. However, pool three above the dam is the primary water supply for several communities in the area. This study developed three dam stabilization options for local governments to consider. Other work for the study included an in-depth environmental analysis of the river habitat as well as a mussel survey that included a search for any endangered species that could potentially be impacted by any future construction. The study was prepared under the authority provided by §22 of the Water Resources Development Act (WRDA) of 1974, known as the Planning Assistance to States program.
- 2011 Green River Section 729 Initial Watershed Assessment (IWA) - The Green River IWA identified existing conditions within the watershed, highlighted the major water resource problems of the watershed and discussed the potential scope and objective of a Final Watershed Assessment based on a shared vision for the watershed. Throughout the planning process, water quality and enhanced community engagement were identified as immediate needs in the watershed. Sedimentation, agricultural inputs, incompatible land use and water supply are some of the predominant water quality concerns in the watershed. The conclusion of the IWA recommended drafting a watershed assessment management plan to define the objectives of the Final Watershed Assessment.

6 Existing Conditions

6.1 Green River Lock and Dam 3

Green River Lock and Dam 3 is located at Green River mile 108.5 near Rochester, Kentucky. Locally, the facility is also known as the Rochester Dam. The normal pool elevation is 379.9. The pool formed by this dam either borders or lies within Ohio and Butler Counties. Towns located near the river in Pool 3 are Rochester, Cromwell, Aberdeen, Morgantown and part of Woodbury. Plate 2 shows the area around the pool formed by Lock and Dam 3.

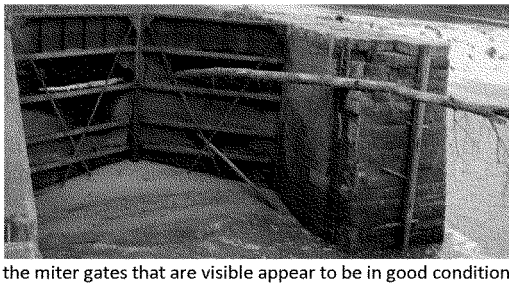
Photo 6.a: Green River Lock 3 (2013)



Built in the period from 1833 to 1838 to enhance commercial navigation, the facility consists of a 353 foot long fixed-crest overflow dam (rock-filled timber crib structure covered with derrick stone) and a 35.8 foot by 137.5 foot stone masonry navigation lock. The dam abuts a shallow rock outcrop that also serves as part of the fixed-crest overflow control for the upper pool. In 1848, a mill was constructed on the rock bluff at the left abutment, and a portion of the rock outcrop was excavated to create a "mill race" that channeled water to power the mill. The facilities were acquired by the federal government in 1895.

In 1981, USACE closed the lock to navigation and placed the facility in "caretaker" status. Since the 1960s, USACE has undertaken studies to evaluate the feasibility of a replacement lock and dam near the existing site, as well as studies to address the condition of the existing structures. However, no documented repairs have been performed on the lock since 1977 (replacement of the lower gates and installation of new operating mechanisms) and no documented repairs have been performed on the dam since 1966 (derrick stone placed on the timber face of the dam).

Photo 6.b: Green River Dam 3 (2013)



The esplanade, although cracked, can still adequately support light cars and trucks. The lock walls, constructed of cut stone masonry, are in good condition. Their alignments are straight and there are no signs of settlement. There are some root intrusions under the first layer of limestone blocks on the riverside. The riverside lock wall is losing some of its limestone blocks on the downstream end of the wall. This loss is far enough away from the downstream miter gates that it should not have an effect on the gates' structural integrity. The portions of the miter gates that are visible appear to be in good condition. The gates are not mitered completely due to some debris stuck between them but the pool has not been compromised due to heavy siltation and woody vegetation growth in front of the upstream and especially the downstream gates. All structural members look sound, and all connections and welds appear to be intact. There are some visible signs of the metal rusting and pitting, but their condition is good overall. The upstream guide wall is made of timber cribbing and appears to be in good condition. The downstream guide wall is made of timber cribbing and is leaning at approximately 20

degrees. It appears that this wall would collapse if it were not for the roots of some adjacent trees holding it up. If the wall were to collapse, it would not have an impact on the rest of the project. The dam appeared intact and stone fill was observed for the entire length of the dam.

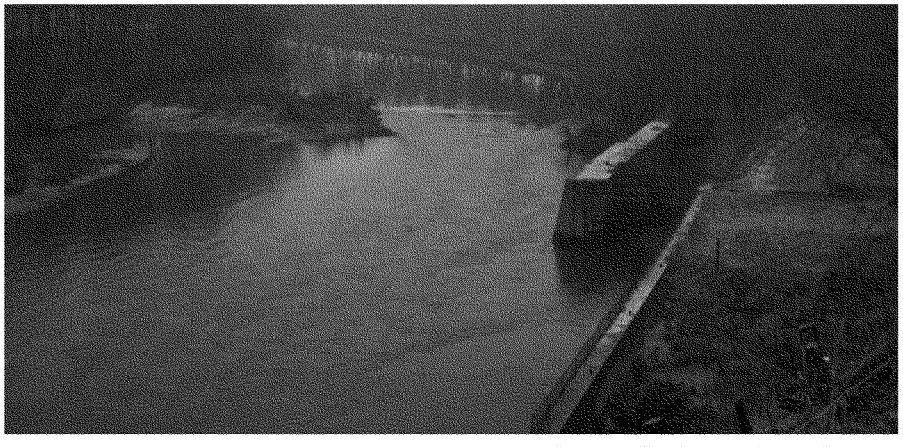
The property at Green Lock and Dam 3 is adjacent to residential and agricultural areas, and as such, is easily accessible to the public. At this site, the lockmaster's house and a maintenance shed are still standing. The roof systems and walls are intact and the buildings are not in any danger of imminent collapse. On several occasions, transients have taken up residence in these structures. Fishermen have been observed out on the lock walls fishing in the tailwater of the dam. Since routine maintenance is no longer performed on the project, significant siltation occurs around the miter gates and in the lock approaches. Considerable debris has accumulated in the area downstream of the lower miter gates, and the upstream approach has heavy siltation.

A Phase I cultural resources reconnaissance undertaken on this facility encountered no evidence of either prehistoric or undisturbed historic archaeological remains. Through documentation of the history and architecture of this facility, USACE has determined that the lock and dam are considered eligible for listing on the NRHP as part of a navigation system. The Phase I cultural resources reconnaissance report and summary of history and architecture report (Appendix A) were coordinated with the KY-SHPO, who concurred in the findings of the reports and that the lock and dam components are considered eligible for the NRHP.

6.2 Green River Lock and Dam 4

The Green River Lock and Dam 4 is located at Woodbury in Butler County, Kentucky at Mile 149.0 on the Green River. Plate 4 shows the area of the lock and dam and the area up to Lock and Dam 5. The normal pool prior to 1965 was 396.1. This pool either borders or lies in Butler and Warren Counties. Part of Woodbury and the community of Glenmore are located near the river in Pool 4.

The facilities were constructed by the Commonwealth of Kentucky in the 1830s and acquired by the federal government in 1886. The navigation structure consists of a 35.8 foot by 137.5 foot lock; and timber cribbing and rock fill dam approximately 409 feet long. The dam failed in May of 1965 and the lock was closed to traffic at that time. The property and all buildings were deeded to the City of Woodbury, which now operates the Green River Museum in one of the former lockmaster's dwellings. The plan and cross-sections of the lock and dam are shown on Plate 5.



In the 48 years since the breach occurred, the upstream approach to the lock has silted in completely and has significant tree growth. From a stability standpoint, the majority of the project is in satisfactory condition. The exception to this observation is a portion of the upstream guard wall, which is in a condition of failure. This wall has settled and rotated landward significantly, and is in a state of total failure. The walls of the lock, constructed of cut stone masonry, show signs of significant surficial weathering with weeds and brush growing through the walls in several places. However, the walls do not show evidence of settlement or movement that would cause concern from a stability standpoint. The miter gates appear to be in good condition. The majority of the dam is gone due to the breach. Significant siltation has occurred downstream of the right bank abutment of the dam which has stabilized the remaining portion of the dam.

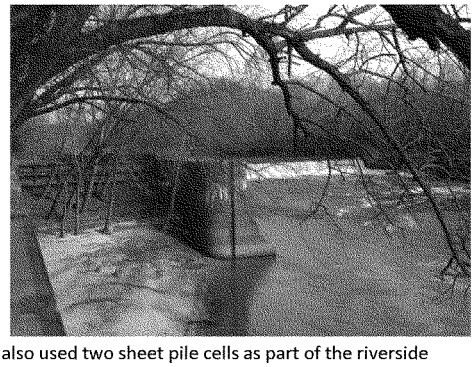
As with Green River Lock and Dam 3, the site is readily accessible and there is ample evidence of unauthorized activity at the site. Fishermen venture across the lock gates to the riverward lock wall to fish.

A Phase I cultural resources reconnaissance undertaken on this facility encountered no evidence of either prehistoric or undisturbed historic archaeological remains. Through documentation of the history and architecture of this facility, USACE has determined that the lock and dam are considered eligible for listing on the NRHP as part of a navigation system. The Phase I cultural resources reconnaissance report and summary of history and architecture report (Appendix A) were coordinated with the KY-SHPO, who concurred in the findings of the reports and that the lock and dam components are considered eligible for the NRHP.

6.3 Green River Lock and Dam 5

The Green River Lock and Dam 5 is located at Mile 168.1 in Warren and Butler Counties, Kentucky near the confluence with Bear Creek. The pool is 13.6 miles long, and the normal pool elevation is 411.0. This pool either borders or lies within Butler, Warren, and Edmonson Counties. The City of Brownsville is located along the river in Pool 5. Plate 6 shows the Pool 5 area. According to the 1932 Ohio River Navigation Charts, Lock and Dam 5 also provided navigation for approximately eight miles of navigation on Bear Creek.

Photo 6.d: Green River Lock and Dam 5 (2013)



The first navigation lock at the site was constructed in 1900. A new lock and dam were built in 1933-1934, and the new lock was put in operation in 1934. The old lock and dam, slightly downstream of the present lock and dam, were removed in 1934. The locks were deactivated in August 1951. The lock is 56 feet wide by 360 feet long. The dam is 301.2 feet long. Plate 7 shows a plan and cross sections of the lock and dam.

The lock walls and dam, which are concrete, appeared to be stable and in good condition. There is some minor weathering and spalling of surficial concrete, but the lock walls do not show evidence of settlement or movement that would cause concern from a stability standpoint. This lock system also used two sheet pile cells as part of the riverside upstream guide walls. These cells, which are linked together by walkway planks, appear to be in very good condition. The miter gates are also in good condition. The miter gates are holding back a significant amount of silt and tree growth. At least ¾ of the upper gates and over half of the lower gates are covered by silt. There is a two-story concrete operations building immediately adjacent to the locks. It is also in good condition. This is one of the two projects in this study that are relatively modern and were operated hydraulically rather than manually.

This site is relatively remote, not being located near any population centers. However, there is evidence that the site is visited regularly, despite its remoteness. Fishing from the riverside lock wall appears to be a regular activity, since remnants of campfires, trash, and discarded fishing tackle have been observed at the site.

A Phase I cultural resources reconnaissance undertaken on this facility encountered no evidence of either prehistoric or undisturbed historic archaeological remains. Through documentation of the history and architecture of this facility, USACE has determined that the lock and dam are considered eligible for listing on the NRHP as part of a navigation system. The Phase I cultural resources reconnaissance report and summary of history and architecture report (Appendix A) were coordinated with the KY-SHPO, who concurred in the findings of the reports and that the lock and dam components are considered eligible for the NRHP.

6.4 Green River Lock and Dam 6

The Green River Lock and Dam 6 and its pool are located entirely in Edmonson County at Brownsville, Kentucky at Green River Mile 181.7. The normal pool elevation is 420.9. There are no urban areas in Pool 6, most of which lies within the Mammoth Cave National Park. Plate 8 shows the Pool 6 area.

The lock and dam were built in 1904-1905 and put into operation in 1906. USACE ceased operation of the lock in 1951. The lock chamber is 36 feet wide by 145 feet long and the dam is 220 feet wide. The lock and dam are constructed of concrete on timber piles. In 1989, a z-pile cutoff wall was constructed upstream and across the upper miter gate to reduce seepage around the gates. This wall was braced with a strut to the miter gates, and the gates were encased in concrete up to elevation 421. This work was performed to stop major seepage through the lock chamber, and end-around seepage occurring through the right bank. Plate 9 shows a plan view and cross sections of the lock and dam.

From a stability standpoint, there are some items of concern related to this lock and dam. The most notable concern is the seepage through and around the upstream land-side lock wall and sheet pile cutoff located upstream of the upstream miter gates. Low areas/sinkholes are still evident in the right bank directly behind the lock wall, indicating seepage is still occurring. Also, water was observed seeping under the land wall into the lock chamber. However, the seepage observed in the lock chamber adjacent to the land wall has been noted as clear for the last several inspections, which may indicate that the movement of material has ceased. Previous inspections have noted seepage through the wall at monolith joints just above the water surface (the lock chamber is always at lower pool as the lower miter gates are no longer in place); however this was not as obvious during the December 2013 inspection due to high water.

Drought in the summer of 2001 led to the unusual condition of having the upper pool actually slightly below the top of the dam, meaning that no water was flowing over the dam. This was the only time in recent history when direct observations of the dam were possible. Observations made at that time revealed that seepage was occurring through the structure at the dam/abutment interface on the left bank and at the dam/river wall interface. Seepage was also observed through a horizontal crack approximately 30 feet in length in the weir about 1.5 feet below the crest. Seepage was occurring through the z-pile wall, which appears to be in a partial state of failure.

At the end of the lower approach wall, where the wall runs into the bank, the wall appears to have settled and rotated outward at the top. Upstream, the upper approach wall directly above the sheet pile cutoff wall is in a state of failure. The downstream miter gates have been cut off and are lying in the chamber. The upper gates were encased in concrete to a height equal to the dam.

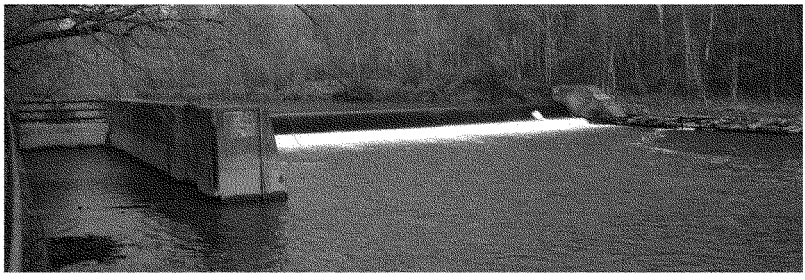
The USACE had an interest in maintaining the pool behind Lock and Dam 6 during the early operational years of the Nolin Lake and Dam Project. Lock and Dam 6 backed a pool up to the tailwater levels of the Nolin Lake and

Dam. In a worst-case scenario, the pooled water would serve to dissipate the energy associated with maximum discharges released through the Nolin Lake and Dam facility. In the 1980's, a design study and reconstruction of the tailwater areas of Nolin Lake were completed, making the interface with the Lock and Dam 6 pool no longer an operational consideration at the upstream end.

The pool from Lock and Dam 6 backs up into the Department of the Interior's Mammoth Cave National Park. The water from the navigation pool has arrested natural cave development for nearly 100 years.

A Phase I cultural resources reconnaissance undertaken on this facility encountered no evidence of either prehistoric or undisturbed historic archaeological remains. Through documentation of the history and architecture of this facility, USACE has determined that the lock and dam are considered eligible for listing on the NRHP as part of a navigation system. The Phase I cultural resources reconnaissance report and summary of history and architecture report (Appendix A) were coordinated with the KY-SHPO, who concurred in the findings of the reports and that the lock and dam components are considered eligible for the NRHP.

Photo 6.e: Green River Lock and Dam 6. Bottom-left: the downstream miter gates are lying at the foot of the lock chamber. (2013)



6.5 Barren Lock and Dam 1

The Barren River Lock and Dam 1 is located in Warren County, Kentucky at Barren River Mile 15. The normal pool elevation is 412.0. The pool extends upstream to approximately River Mile 30, in Bowling Green. This pool is located entirely within Warren County. Bowling Green is the only community on the Barren River in Pool 1. Plate 10 shows the Pool 1 area.

The Commonwealth of Kentucky built the original lock and dam in 1841. The federal government acquired the facility in February 1886. A new lock was built by the USACE in 1933-1934 at the same site, and was put into operation in September 1934. The locks are constructed of concrete, the newer lock being founded on timber piles. The dam is timber crib construction founded on timber piles with a concrete cap. The old lock is 35.6 feet wide by 143 feet long and was no longer used following the completion of the new lock in 1934. The newer lock is 56 feet wide by 360 feet long. The dam is approximately 276 feet long. The new lock closed to traffic after the failure of the dam at Green River Lock and Dam 4, in May 1965, since navigation beyond that point was not possible. Plate 11 shows a plan view and cross sections of the lock and dam.

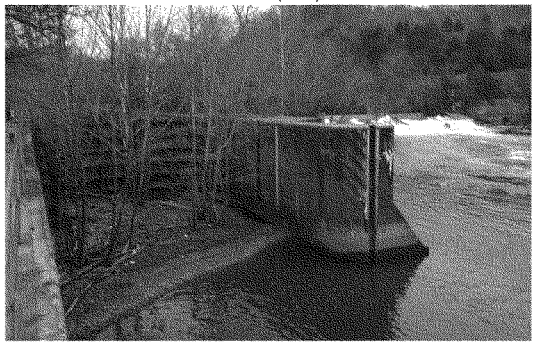
The lock walls, which are concrete, are in good condition, with the exception of minor weathering. The downstream side of the dam has some surficial damage, as indicated by zones of turbulent water flow. The lock walls do not show evidence of settlement or movement that would cause concern from a stability standpoint. The miter gates are in good condition. The two-story control tower is missing windowpanes and has evidence of bullet holes, but there is no exposed reinforcing and the overall condition of the concrete is good. The lock and guide walls are in good condition. The old lock chamber was put out of service by placing a concrete cutoff wall

across the upstream sill, and putting rock fill in the rest of the chamber. This concrete cutoff wall appears to be in good condition. There is not much evidence of the rock fill in the chamber.

The downstream concrete apron of the dam has been undermined. Some sections of the apron have shifted and settled due to loss of the underlying fill. The void under the downstream apron of the dam has been there for quite some time. During the December 2013 inspection, the lower pool was up on the downstream apron and significant water was flowing over the dam so signs of under-seepage could not be observed. The dam is constructed from timber cribbing and rock fill with a concrete cap founded on timber piling.

A Phase I cultural resources reconnaissance undertaken on this facility encountered no evidence of either prehistoric or undisturbed historic archaeological remains. Through documentation of the history and architecture of this facility, USACE has determined that the lock and dam are considered eligible for listing on the NRHP as part of a navigation system. The Phase I cultural resources reconnaissance report and summary of history and architecture report (Appendix A) were coordinated with the KY-SHPO, who concurred in the findings of the reports and that the lock and dam components are considered eligible for the NRHP.

Photo 6.f: Barren River Lock and Dam 1 (2013)



7 Real Estate Interests at the Sites

Appendix F contains a complete description of the real estate holdings and the history of the sites. Table 7.1 summarizes the real estate holdings at each site. Acreages displayed in the "Right Bank" and "Left Bank" columns represents remaining real estate holdings after the transfers noted in the "Comments" column.

7.1Real Estate Interests at Each Lock and Dam Site

L&D No.	Right Bank	Left Bank	Comments
Green 3	6.72 ac, Ohio Co.	4.99 ac, Muhlenberg Co.	5.01 ac on left bank transferred to US Dept. of Interior in 1980.
Green 4	none	0.01 ac, Butler Co. (gauging station)	26.74 ac have been disposed of
Green 5	27.07 ac, Butler Co.	5.21 ac, Warren Co.	2.45 ac on the left bank and 10.49 on the right bank have been disposed of.
Green 6	18.0 ac, Edmonson Co.	4.19 ac, Edmonson Co.	6.22 ac on left bank have been disposed of.
Barren 1	16.63 ac, Warren Co.	none	11.47 ac previously disposed of.

8 Disposal of United States Real Property

The disposal of Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 are not included in the recommended plan. However, following Congressional deauthorization of commercial navigation at these facilities, a logical next step would be to seek disposal of these properties and facilities; potential environmental effects would need to be considered by the appropriate agency before such action could occur. The USACE has completed several real estate disposal actions since 1995 at Green River Locks and Dams 3, 4, 5, 6 and Barren River Lock and Dam 1 (additional detail is located in Appendix F). These disposal/out-grant actions were part of a larger Corps effort to identify and dispose of civil works real property that was excess to the operational needs of the Corps and were part of a coordinated effort between Headquarters, Division, and the District. The properties were generally not located in the near vicinity of the current lock and dam structures (i.e. generally real property held over from prior transfers from the State and/or lands adjacent to the old lock structures that had been removed and were located upon real estate that clearly was not required to operate the "newer" structures). Future disposal of the remaining property listed in Table 7.1, including the lock and dam structures, would not occur until Congress deauthorized the navigation purpose of the facilities. Disposal of the facilities would ultimately allow future owners to determine the most appropriate use of the facilities since they are no longer used for their intended purpose of navigation (e.g., maintenance of the facilities to ensure existence of the pools for water supply or removal of the low-head dams to address safety concerns and provide ecological benefits). Disposal of the facilities would also relieve the Corps of unnecessary operation and maintenance costs in addition to liability concerns associated with trespassing and dam safety.

If the property is disposed of in the future and there is no specific legislation directing the disposal, the property would be disposed of in accordance with the Federal Property and Administrative Services Act of 1949 and Army regulations. The disposal process begins with an estimate of the current fair market value. The Department of Defense has a delegation of authority from GSA that allows the USACE to dispose of excess real property with a estimated fair market value is less than $50,000. This delegation does not preclude GSA from disposing of property on behalf of the USACE.

8.1 Disposal by GSA

If the facilities are to be disposed of by GSA, a Report and Recommendation of Excess (RROE) is prepared and submitted, along with environmental and cultural resources clearances, through the Great Lakes and Ohio River Division to USACE headquarters for approval. When approval of the RROE is received, the USACE would screen the property with the Department of Defense for interests. If there is no Department of Defense interest, a SF 118 - Report of Excess Real and Related Personal Property would then be prepared and forwarded to the appropriate GSA regional office. GSA would perform the disposal including screening with the Department of Housing and Urban Development, and Federal, state and local governments.

Early coordination with GSA's Real Property Utilization and Disposal Division indicates the properties would most likely be accepted for disposal "as is", subject to physical inspections by GSA staff. The USACE would remain the responsible landholding agency during the disposal process.

8.2 Disposal by the USACE

If the facilities are to be disposed of by the USACE, a RROE is prepared and submitted, along with environmental and cultural resources clearances, through the Great Lakes and Ohio River Division to USACE headquarters for approval. After approval of the RROE is received, environmental and cultural resources requirements are completed and the property is screened with nondefense federal agencies, the Department of Defense, Department of Housing and Urban Development, Federal, state, and local governments for any interest. If no interest is expressed, the property would be disposed of by negotiated or competitive sale to the public.

Any conveyance of the property would be by quitclaim deed. Conveyance would be made subject to existing easements for public roads and highways, public utilities, railroads and pipelines; and to reservations, exceptions and any other outstanding rights contained in or referred to in patents issued by the United States of America. The United States would not retain any liability for the property disposed of.

The Louisville District real estate administrative costs for processing a disposal action would vary depending on specifics of the project but are estimated to be approximately $20,000 per site.

8.3 General Disposal Discussion

Deauthorization of the projects is not anticipated to alter the United States' ownership of the structures in the waterway. The purpose of seeking deauthorization is to allow the District to dispose of the lands and structures. There is also precedent for disposing of locks and dams in Kentucky via special legislation as evidenced by the successful transfer of Kentucky River Locks and Dams 5-14 that occurred in the 1990's. Special legislation was drafted that directed the District to dispose of the lands and structures to a state agency. The disposal of the Green and Barren River Locks and Dams could follow similarly.

After deauthorization, currently no permits or licenses would be required from the Commonwealth to maintain the structures in the waterway. The Louisville District's Regulatory Office has advised that the structures would be grandfathered-in and not require permit actions (if no modifications were undertaken). However, it is likely that a section 404 permit under the Clean Water Act along with a section 10 permit under the Rivers and Harbors Act would be required of a new owner if the structures were modified.

9 Non-Navigation Facilities in the Navigation Pools

9.1 Water Intakes in the Green River Navigation Pools

Kentucky Revised Statute 151.120 defines public water as: "Water occurring in any stream, lake, groundwater, subterranean water or other body of water in the Commonwealth which may be applied to any useful and beneficial purpose is hereby declared to be a natural resource and public water of the Commonwealth..."

Water withdrawals must be permitted under state law, with the exception of water used in the generation of electricity and single domestic users. This requirement applies even if the land surrounding the water source is privately owned (including underground reservoirs, irrigation, storage or sediment impoundments). In addition to the traditional uses of drinking water and industrial process water, authorization is required for such diverse uses as deep mine and quarry dewatering operations, golf course withdrawals for irrigation, trout farms, artificial waterfalls, coal prep plant recycling ponds, etc.

Water intakes on the Green River that are located within the project study area are shown in Table 9.1. The depth of intake is given as the approximate depth below the water surface at normal summer levels.

The City of Morgantown, Butler County Water System, Inc. and the Ohio County Water District created the Rochester Dam Regional Water Commission (RDRWC) in June 2013. These three public utilities, in collaboration with local county governments, created the RDRWC pursuant to KRS 74.420 to 74.520 for the purpose of ensuring and providing an adequate and dependable supply of water. Specifically, these groups are focused on maintaining the pool formed by Green River Lock and Dam 3. In a letter dated 2 November 2012 the RDRWC expressed their interest in exploring the possibility of taking ownership of the property from the United States Government, if and when the USACE disposes of it.

During public meetings and coordination with local authorities, it was discovered that there are a number of individuals with agricultural irrigation intakes in these pools. No agricultural intakes have been permitted by the state. So while these intakes may exist, there is no data on their locations or the quantity of water withdrawn.

The USACE's authority over the waters of the Green and Barren Rivers extends to navigational servitude and regulatory authority under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Under these authorities, the USACE has granted permits for all of the water intake structures that the state has also permitted. Until the 1960's the primary purpose of the regulatory program was to protect navigation. Since then, as a result of laws and court decisions, the program has been broadened so that it now considers the full public interest for both the protection and utilization of water resources.

The locks and dams were built for the sole purpose of facilitating navigation, and providing water for water supply is not an authorized purpose of these projects. Therefore, the USACE has no obligation at all to maintain these pools to enable users to withdraw water. During discussions with local communities about alternative plans, they were reminded that the USACE had no authority or obligation to maintain the pools for water supply.

9.1 Water Intakes in the Green and Barren Pools

intake owner	river mile	max withdrawal	water supplier	# intakes @ depth
Bowling Green Country Club	Barren 30.2	0.3 MGD	No	Unknown
Bowling Green Municipal Utilities	Barren 37.8	20.0 MGD	Yes	Unknown
Ohio County Water District	Green 130.6	1.9 MGD	Yes	1 @ 10 ft 1 @ 15 ft
Perdue Farms Inc.	Green 130.5	3.0 MGD	Yes*	1 @ 8 ft
Butler County Water System	Green 142.2	0.5 MGD	Yes	1 @ 3 ft
Morgantown Utilities	Green 143.3	0.972 MGD	Yes	1 @ +8 ft ** 1 @ 6 ft
Edmonson County Water District	Green 181.3	1.0 MGD	Yes	1 @ 5 ft 1 @ 8 ft 1 @ 12 ft

*Provides water to Ohio County Water District.

**This is the high water intake. At normal low water it is approximately 8 feet above the water surface.

9.2 Ferries in the Green River Pools

There are four ferries that have operated in the navigation pools of the Green River. Table 9.2 summarizes them.

The ferries' approaches at all of these locations are also used for boat ramps by recreational boaters.

9.2 Ferries in the Green River Pools

Location	River Mile	Road Served	Operation	Pool
Rochester	108.9	Hwy 369	Private	Green L&D 3
Reeds Ferry	123.2	Hwy 269	Public (county)	Green L&D 3
Houchins Ferry	185.1	Houchins Ferry Rd	Public (National Park Service)	Green L&D 6
Green River Ferry	197.2	North Entrance Rd/ Green River Ferry Rd	Public (National Park Service)	Green L&D 6

9.3 Boat Ramps in the Green & Barren Pools

The Green and Barren Rivers are used by recreational boaters as well as by commercial fishermen fishing for mussels, catfish, and buffalo fish. Table 9.3 lists boat ramps in the study area. An exhaustive list of boat ramps is available through the Kentucky Department of Fish & Wildlife Resources.

9.3 Boat Ramps in the Green & Barren Pools

river mile	bank	location/nearest feature	pool	comments
Green River Mile 134.5	right	1.4 miles upstream from Cromwell	Green River L&D 3	
Green River Mile 149.6	both	just upstream from Woodbury	Green River L&D 4	At the confluence of the Green and Barren Rivers; was once a ferry crossing.
Green River Mile 166.9	left	just upstream of State Hwy 185	Green River L&D 4	This is the Arrue Young boat ramp.
Barren River Mile 14.5	right	Greencastle	Green River L&D 4	
Green River Mile 168.4	both	Glenmore	Green River L&D 5	Was once a ferry crossing.
Green River Mile 175.6	left	37° 9'7.52"N, 86°18'19.71"W	Green River L&D 5	Private boat ramp
Green River Mile 180.3	left	Brownsville City Park	Green River L&D 5	
Barren River Mile 30.1	left	Bowling Green	Barren River L&D 1	

9.4 Canoeing on the Green & Barren Rivers

Canoeing may be found anywhere on the Green and Barren Rivers, but it occurs most frequently in Mammoth Cave National Park near Green River Lock and Dam 6. Data for boat and canoe use in the National Park is provided in Table 9.5, while Table 9.4 lists the canoe liveries operating in the study area. Currently, the National Park Service Rivers, Trails and Conservation Assistance Program is working with the Barren River Area Development District on a Blueway Water Trail for the Green River. The stretch of the Green River, already popular with canoeists and kayakers, is expected to see increased usage with the development of the Blueway Water Trail. The proposed Green River Blueway Water Trail would eventually extend 300 miles from the tailwaters of Green River Lake Dam to the confluence with the Ohio River.

9.4 Canoe Liveries in the Study Area

Big Buffalo Crossing 100 River Rd. Munfordville
Cave Country Canoe 856 Old Mammoth Cave Rd. Cave City
Green River Canoeing Inc. 1145 S. Main Brownsville

9.5 Observed Boat and Canoe Use on the Green River

calendar year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
vessels	11,157*	12,689	10,969	11,955	9,545	11,877	12,275	7,976	11,854	10,033

*Estimated data for Dec-13 was not available; usage was projected based on the December average from 2012 - 2004.

These numbers are approximate and were counted by the river ferry operators in Mammoth Cave National Park.

10 Plan Formulation

The purpose of this study is to first provide information necessary to make final recommendations to Congress as to deauthorization of the facilities at five lock and dam sites; and second, to provide information to ultimately facilitate the future disposal of these facilities after deauthorization has been approved. The study structure approximates a typical USACE feasibility study; however, it does not include a traditional Benefit Cost Ratio (BCR) and supporting economic analysis because there is not a formal planning procedure that specifies how to account for, quantify and compare costs associated with the deauthorization, modification and disposal of these facilities.

10.1 Problems and Opportunities

10.1.1 Problem Identification

- Five locks and dams on the Green and Barren Rivers are no longer used for navigation and have fallen into disrepair. The USACE remains responsible for these facilities despite there being no USACE federal interest in repairing, operating or maintaining them.
- Use of the pools formed by the dams has expanded beyond the original authorized purpose of navigation. As an example, multiple communities now depend on the pools formed by these facilities for water supply.
- There are safety concerns relative to life and property associated with the lock and dam structures at each site that require attention.

10.1.2 Opportunity Statements

- Altering structures to lessen the risk of injuries associated with unauthorized entry upon the sites.
- Restoring natural river flow wherever practical to provide ecosystem restoration opportunities in partnership with stakeholders and existing USACE authorities.
- Identifying potential interested parties to facilitate disposal if the facilities are deauthorized.
- Preservation of local transportation routes and local water supplies.

10.2 Planning Objectives and Constraints

10.2.1 Objectives

- Provide information necessary to make final recommendations to Congress as to deauthorization of the facilities at five lock and dam sites.
- Relieve USACE of continued O&M responsibilities and exposure to continued and future exposure to liability associated with these facilities.

10.2.2 Constraints

- Ecosystem benefits from removal of the dams (under alternative 3) are not specifically evaluated as part of this study. USACE has the authority to plan, design, and build projects to benefit the environment. These projects require a local sponsor; none has been identified yet.
- Absent specific authority, the interdepartmental waiver rule operates to preclude a Federal agency from paying compensation to another Federal agency for damage caused to that Federal agency's property (e.g. ferry ramp extensions).
- There is not an overriding USACE policy favoring the investment of federal funds in order to dispose of structures and associated real property that no longer serve a USACE mission.

- USACE does not have an authority to expend funds to modify water supply systems or assist other entities to modify theirs. Consequently, impacts to municipal water supplies should be avoided.

10.3 Alternative Plans

The various studies conducted, beginning in 1965 and running through 1993, established that there would be insufficient benefits from commercial navigation to support any type of navigation improvements to these facilities. Therefore, no alternatives that involved the restoration of commercial navigation to the study area were considered. Further, since the authorized purpose of the projects is commercial navigation, it was concluded that these facilities are no longer serving their authorized purpose and that it would be in the federal interest to deauthorize the projects and dispose of the properties. Therefore, the alternatives considered included no action and various options for disposal.

To facilitate the formulation of alternative plans, the 2004 technical investigations were reevaluated in the course of this study. Reports on these investigations are contained in the appendices. The investigations and analyses in these appendices contain information on the following:

A. An investigation of the cultural resources

B. Detailed data on the structures' condition, and measures necessary to maintain structural integrity

C. Hydrologic and hydraulic analyses for the Green and Barren Rivers in their existing condition and with the dams removed, either by demolition or failure

D. An environmental assessment of all of the alternatives considered, including no action

E. An environmental baseline survey investigating the possible presence of hazardous, toxic, and radiological waste

F. A complete investigation of the real estate interests at each site

G. Coordination with the U.S. Fish and Wildlife Service

H. A description of comments received during the public review of the study

Each alternative was considered for every site. A more detailed description of each alternative follows.

Alternative 1 (No Action)

With the "no action" alternative, the locks and dams would remain in federal ownership in caretaker status and the federal government would not make any alterations to the facilities. The USACE would remain responsible for the facilities. At present, the USACE spends approximately $10,000 per year for all of the sites to inspect the properties and maintain "No Trespassing" signage. While trespassing is prohibited, there is ample evidence that the sites are frequently used, even those that are relatively remote. With a "no action" alternative, this would likely continue.

Alternative 2 (Congressional Deauthorization Only)

Request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1.

Alternative 3 (Deauthorization, Dam Removal, Lock Fill and Installation of Warning Signs)

Request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. Remove all dams, fill locks, and ultimately dispose of the properties. The

excess dam materials would be disposed of onsite along the lock approaches or in an approved offsite location. Three warning signs would be equally spaced and installed on the lock side chamber walls.

Alternative 4 (Deauthorization, Lock Stabilization, Installation of Barricade and Warning Signs)

Request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. Dispose of the properties after the locks are modified to ensure stability and pool retention before disposal. To impede access to the riverside lock wall, the landside miter gates would be barricaded. Three warning signs would be equally spaced and installed on the lock side chamber walls.

10.4 Screening Criteria

Each alternative was evaluated for its impact on unauthorized entry, water supply, boat ramps, ferries, other facilities, environmental effects and cost. These criteria were considered to be significant factors in evaluating the recommended plan for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. The subsequent text outlines the criteria and highlights how they were considered. Further deliberation was also given to what actions could be accomplished by the Louisville District through existing authorities and the established O&M budgetary process and what required specific legislative action by Congress.

Unauthorized Entry: Access to all of the lock and dam sites cannot be fully controlled. However, some measures can be taken to deter entry and possibly reduce injuries associated with unauthorized entry upon the property. The array of measures considered ranges from no action to filling the lock chambers with rock. In screening the measures, it was determined that signage and blocking access to the riverside lock chamber wall provided the optimal balance of potential measures. These maintenance activities can be accomplished through the established O&M budgetary process and are not included in the recommended plan.

Water Supply: A paramount concern for communities in the study area is the impact of any recommendation on the community's water supply. This variable identifies if any activity taken at the Lock and Dam site would have an impact on water intakes. During screening, an impact to public water supply by an alternative was considered negative and that alternative was eliminated from consideration based on the constraints identified in Section 10.2.2. In addition, the USACE does not have an authority to expend funds to modify water supply systems or assist other entities to modify theirs. From a USACE perspective, water supply at these facilities is considered to be a state or local responsibility since navigation is currently the only Congressionally authorized purpose at these facilities.

Boat Ramps: There are multiple boat ramps in each of the pools formed by the locks and dams. Consideration was given to how each alternative would impact the ability to operate the boat ramp and if any modification to the ramp would be required in connection with a recommended alternative.

Ferries: Ferries that cross the Green River in Edmonson County and in Rochester, KY provide transportation linkages for several communities in the study area. Impacts associated with each alternative were evaluated and mitigation for the potential loss of the ferry crossing was considered. As described in Section 10.2.2, the interdepartmental waiver rule operates to preclude a Federal agency from paying compensation to another Federal agency for damage caused to that Federal agency's property.

Other Facilities: This variable considered water intakes and utility transmission lines by private individuals and corporations. The facilities identified ranged from poultry processing plants to private golf course irrigation intakes.

Environmental Considerations: Environmental considerations at each site focus on returning the river to pre-impoundment flow conditions. At several locations in the study area, this aspiration competes with social-

economic considerations such as transportation linkages in Edmonson County and water supply in Muhlenberg County. At all of the sites there is an overlay of interest in cultural resources – specifically in acknowledging the historical role that these locks and dams have played in shaping the economic and cultural landscape of the region and nation.

10.5 Comparison of Alternative Plans

10.5.1 Alternative 1(No Action)

There is interest from various local and federal entities (see Appendix I – Public Involvement) in acquiring the properties at Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. With alternative 1, the no action plan, the complete transfer of the properties and structures is not possible without Congressional deauthorization.

There are stability concerns associated with Green River Lock and Dam 6, which could result in the failure of the dam and lock wall. If the lock wall suddenly fails, flow would be diverted toward the abutment, significantly widening the existing channel or even creating a new channel. Bank erosion would be severe as the river is redirected and flows increase. The water supply intake for the Edmonson County Water District is 1,500 feet downstream of the dam on the right bank and could be affected by a catastrophic failure. In addition to the damage that could occur at the water intakes, sudden failure of the lock and/or dam would have serious consequences for the ferries. The loss of the Lock and Dam 6 pool would likely render the ferries inoperable except during high water. These two ferries are transportation links in the region, and their loss would have substantial impacts to the community.

Under alternative 1, all facilities would remain in caretaker status and no alterations to the structures would be completed to address the current conditions of the locks or dams.

With this alternative, the USACE would remain responsible for the facilities and maintain "No Trespassing" signage and conduct periodic inspections. However, the risk to boaters associated with the presence of low head dams would continue.

10.5.2 Alternative 2 (Congressional Deauthorization Only)

Alternative 2 exclusively seeks Congressional deauthorization of commercial navigation at Green River Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1.

Following Congressional deauthorization of commercial navigation at these facilities, a likely consequence is future action to dispose of the facilities. The facilities would be disposed of through the established USACE and GSA procedures pursuant to the Federal Property and Administrative Services Act of 1949 and Army regulations. The disposal would take place incrementally as funds become available through the established USACE O&M budget process. Additionally, safety related maintenance (barricades at the miter gates and signage) and ecosystem restoration opportunities would also be pursued through established USACE authorities and budgetary process. While the installation of warning signs and barricades are reasonable measures to address public safety concerns due to illegal access, extensive measures (such as removal of all dams and filling or removal of the associated lock chambers) would need to be taken to remove all risk; these actions would require modifications to water intake structures and other potential uses provided by the facilities. In addition, the risk of structural failures (particularly at Green River Lock and Dam 6) remains; any structural failures could have consequences to downstream communities.

10.5.3 Alternative 3 (Deauthorization, Dam Removal, Lock Fill and Installation of Warning Signs)

If alternative 3 were implemented at all sites, the lock chambers would be filled, reducing public safety concerns by lessening the risk of injuries associated with unauthorized entry while stabilizing Green River Lock 6.

Removing the dams would also reduce the risk to boaters who may inadvertently be carried over the dam and become trapped in the hydraulic effect (rotating current) at the downstream base of the dam. This was illustrated in April 2014 when a johnboat went over Barren River Dam 1, resulting in a drowning fatality.

Warning signs would be installed on the landside lock chamber walls at all of the facilities to deter unauthorized entry upon the property

There are also potential aquatic ecosystem restoration benefits associated with the removal of Green River Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. These benefits are most apparent at Green River Dam 6, which is just downstream of Mammoth Cave National Park. Running 27 miles through the park, the Green River is one of North America's most biologically diverse rivers. Additionally, the cave itself holds the world's most diverse cave ecosystem. Removing the dam would enhance the cave ecosystem; would enhance the river ecosystem returning approximately 6 - 8 miles to its former free-flowing state; and would bolster recreational opportunities available through canoeing, kayaking and camping. It is expected that both Edmondson County and the City of Brownsville would see a positive economic benefit from the removal of Dam 6 associated with increased canoe and kayak activity. Habitat for threatened and endangered species would be increased as well.

While the USACE has authority to plan, design, and build projects to benefit the environment, these projects require a local sponsor. Throughout the study process, the Corps was not able to identify a local or state agency willing to share in the costs of dam removal for environmental purposes. Therefore, USACE could not recommend the removal of the dams for environmental reasons.

It would be problematic to remove all dams given multiple communities dependence upon the pools for water supply. Water supply is not an authorized purpose of this project; however, over the years, the local communities have come to depend on the pool impounded by Green River dams 3 and 5 for their water supply. Specifically, removing Green River dam 6 would have serious impacts on the public water supply and Rochester Ferry. Five water intakes for potable water are located in the Green River Lock and Dam 3 pool. These intakes serve three water districts that provide water for the residents of Ohio County, Butler County, Muhlenberg County and the City of Morgantown. Additionally, the Perdue Farms processing facility also has a water intake at river mile 130.4 in Cromwell for their poultry processing facility. Appendix C contains a profile showing the effects of removing the dam on the pool level. These intakes would not function if the dam were removed. Replacing these intakes with wells is not a viable alternative, as there is not an aquifer capable of meeting the demand. In addition, the USACE does not have an authority to expend funds to modify water supply systems or assist other entities to modify theirs. The USACE does have the capability to undertake a water study through Section 22 of the 1974 Water Resources and Development Act with a local sponsor. However, under this program, the USACE may not participate in any formal design or implementation activities.

If alternative 3 were implemented, the ferry crossings in Mammoth Cave National Park would be affected by the removal of Green River Dam 6. The two ferries affected, Green River Ferry and Houchins Ferry, would require modifications to remain operable. Public support for removing the dam is questionable unless provisions are made for the continued ability of the ferries to operate. Views opposing the cessation of the ferry operation have been expressed in public meetings, in coordination with Edmonson County officials and in the media. Both of these ferries are operated and maintained by the National Park Service and absent specific authority, the interdepartmental waiver rule operates to preclude a Federal agency from paying compensation to another Federal agency for damage caused to that Federal agency's property. Consequently, USACE would not have the ability to implement modifications to the ferry ramps that would be necessary if Green River Dam 6 was removed.

This alternative would request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. After the recommended construction is complete, all of the properties would be disposed of through the normal USACE and GSA property disposal procedures.

10.5.4 Alternative 4 (Deauthorization, Lock Stabilization, Installation of Barricade and Warning Signs)

To lessen the risk of injuries associated with unauthorized entry, the upstream and downstream miter gates would be gated with barricades on the landside miter gates at Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. At all of the sites, accumulated silt and vegetation in all of the lock chambers is substantial enough to provide a means of egress. Sediment is expected to continue to collect in the lock chamber provided the upstream miter gates remain closed. If alternative 4 were implemented, it would only partially address the safety concerns at all of the sites, as the risk to boaters still remain with the continued presence of low head dams.

This alternative would request Congressional deauthorization of commercial navigation for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. After the recommended construction is complete, all of the properties would be disposed of through the normal USACE and GSA property disposal procedures.

11 Recommended Plan

The primary goal of this disposition study is to deauthorize the Locks and Dams and identify potentially interested parties and actions necessary to dispose of the properties at a future time. The draft of this study was circulated for public comment during February 2014 and included construction recommendations for several of the Lock and Dams and the removal of Green River Lock and Dam 6. Those actions are no longer recommended due to the expense and the potential to pursue dam removal through existing USACE authorities or via action by another federal agency.

Consequently, the recommended plan (Alternative 2) was revised and seeks to delineate what action is required by Congress and what can be accomplished by the Louisville District through existing authorities and the established O&M budgetary process. While there are opportunities for ecosystem restoration and improved safety at all of the sites, deauthorization of commercial navigation is the sole action that is required of Congress.

While each site was considered separately, the final recommended plan considered the Green and Barren river system as a whole. By leaving all the locks and dams, there would be no social impacts or further negative environmental impacts. As a whole, the plan minimizes adverse social impacts, causes no further negative environmental impacts and facilitates the future disposal of the properties in the most efficient manner. Finally, there are no additional annual O&M costs or construction associated with the recommended plan. Future "one-time" activities (installation of signage, installation of barricades, disposal) and associated cost estimates will be handled on a case-by-case basis through the established O&M budget process.

12 Mitigation Requirements

As a result of archaeological investigations, no prehistoric or undisturbed historic archaeological remains were documented. Therefore, under the described plan no prehistoric or undisturbed historic archaeological remains would be affected. Documentation of the history and architecture of these facilities has determined that the locks and dams are considered eligible for listing on the NRHP. Under the described plan, Congressional deauthorization of commercial navigation would have no adverse effect.

The KY-SHPO has commented that the future disposition of Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 would have an adverse effect on these NRHP eligible properties. Transfer from Federal ownership is considered an adverse effect. Further consultation with the KY-SHPO and other interested parties would be undertaken to determine appropriate mitigation measures for inclusion in a Memorandum of Agreement (MOA) to address project effects. Development of a MOA would be completed prior to implementing this plan.

Although some coordination on possible mitigation alternatives for cultural resource impacts was completed under the 2004 study, further coordination with the KY-SHPO and other interested parties would be required if the properties are disposed of and/or altered. Through recent coordination with the KY-SHPO, there is no anticipation for further formal studies, but current photo documentation of the resources would be required.

The timing for the consultation would be dependent upon the receipt of funding to undertake Section 106 consultation needed for MOA development. The Section 106 consultation and execution of a MOA would be completed prior to the commencement of any disposal activities. As part of the Section 106 consultation process the USACE would notify the Advisory Council on Historic Preservation of the undertaking affecting NHRP eligible properties. This timing was coordinated with the KY-SHPO and is documented in the 26 March 2014 comment letter, which is included in Appendix A.

13 Conclusions

- The existing navigation facilities at Green River Locks and Dams 3 through 6 and at Barren River Lock and Dam 1 are not serving the federal authorized purpose of commercial navigation and cannot reasonably be expected to do so in the foreseeable future.
- Green River Locks and Dams 3 and 5 are serving incidental purposes, namely water supply, and while there is significant nonfederal interest in maintaining these pools for that purpose, there is no USACE authority to maintain them for that purpose.
- Safety concerns were identified at Green River Locks and Dams 3 through 6 and at Barren River Lock and Dam 1. These safety concerns would be addressed at each site by installing barricades on miter gates, as well as updating signage at the sites. This maintenance work would not require any additional NEPA compliance activities and would be funded through the established O&M budget process.
- Following Congressional deauthorization of commercial navigation at these facilities, a likely consequence in the future is disposal of the properties through the established USACE and GSA procedures pursuant to the Federal Property and Administrative Services Act of 1949 and Army regulations. The disposal would take place incrementally as funds become available through the established USACE O&M budget process. Because established procedures exist for disposal and conveyance of federal property, it is my opinion that no additional authorization is required from Congress to dispose of the facilities.
- The study identified potential opportunities for ecosystem restoration in the Upper Green River System. There are standing authorities for ecosystem restoration projects of this nature which can be pursued by the USACE in partnership with other federal non-federal interests.

14 Recommendation

In view of the conclusions set forth, and after considering the expected social, economic, and environmental impacts, I recommend the following actions regarding the disposition of the formerly used navigation facilities on the Green and Barren Rivers, Kentucky:

The Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 should be deauthorized for commercial navigation, as they are no longer serving this authorized purpose.

The recommendation contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendation may be modified before they are transmitted to Congress as proposals for authorization and implementation funding. However, prior to transmittal to Congress, the States, interested Federal agencies, and other parties would be advised of any modifications and would be afforded an opportunity to comment further.

Christopher G. Beck
Colonel, Corps of Engineers
District Engineer

PLATE 1

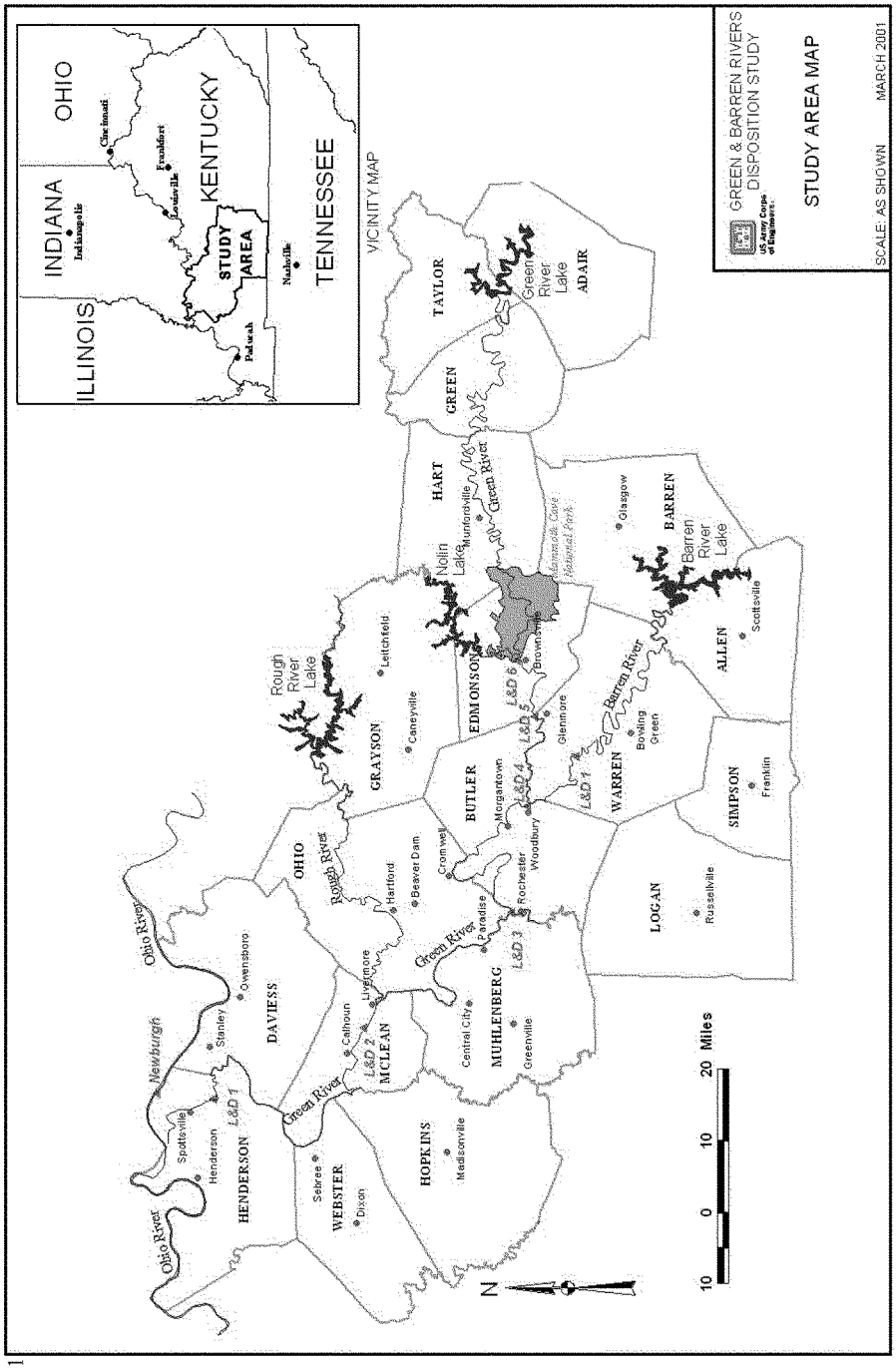

VICINITY MAP
INDIANA
OHIO
ILLINOIS
KENTUCKY
TENNESSEE
STUDY AREA
Indianapolis
Cincinnati
Louisville
Frankfort
Paducah
Nashville
GREEN & BARREN RIVERS DISPOSITION STUDY
STUDY AREA MAP
SCALE: AS SHOWN
MARCH 2001
Ohio River
Newburgh
Spottsville
Henderson
Stanley
Owensboro
Sebree
Dixon
Calhoun
Livermore
Central City
Greenville
Madisonville
Hartford
Beaver Dam
Cromwell
Rochester
Woodbury
Paradise
Morgantown
Caneyville
Leitchfield
Rough River Lake
Nolin Lake
Munfordville
Brownsville
Mammoth Cave National Park
Glenmore
Bowling Green
Glasgow
Barren River Lake
Scottsville
Franklin
Russellville
Green River Lake
DAVIESS
HENDERSON
MCLEAN
HOPKINS
WEBSTER
MUHLENBERG
OHIO
GRAYSON
BUTLER
EDMONSON
HART
GREEN
TAYLOR
ADAIR
WARREN
BARREN
ALLEN
SIMPSON
LOGAN
L&D 1
L&D 2
L&D 3
L&D 4
L&D 5
L&D 6
N
10 0 10 20 Miles

PLATE 2

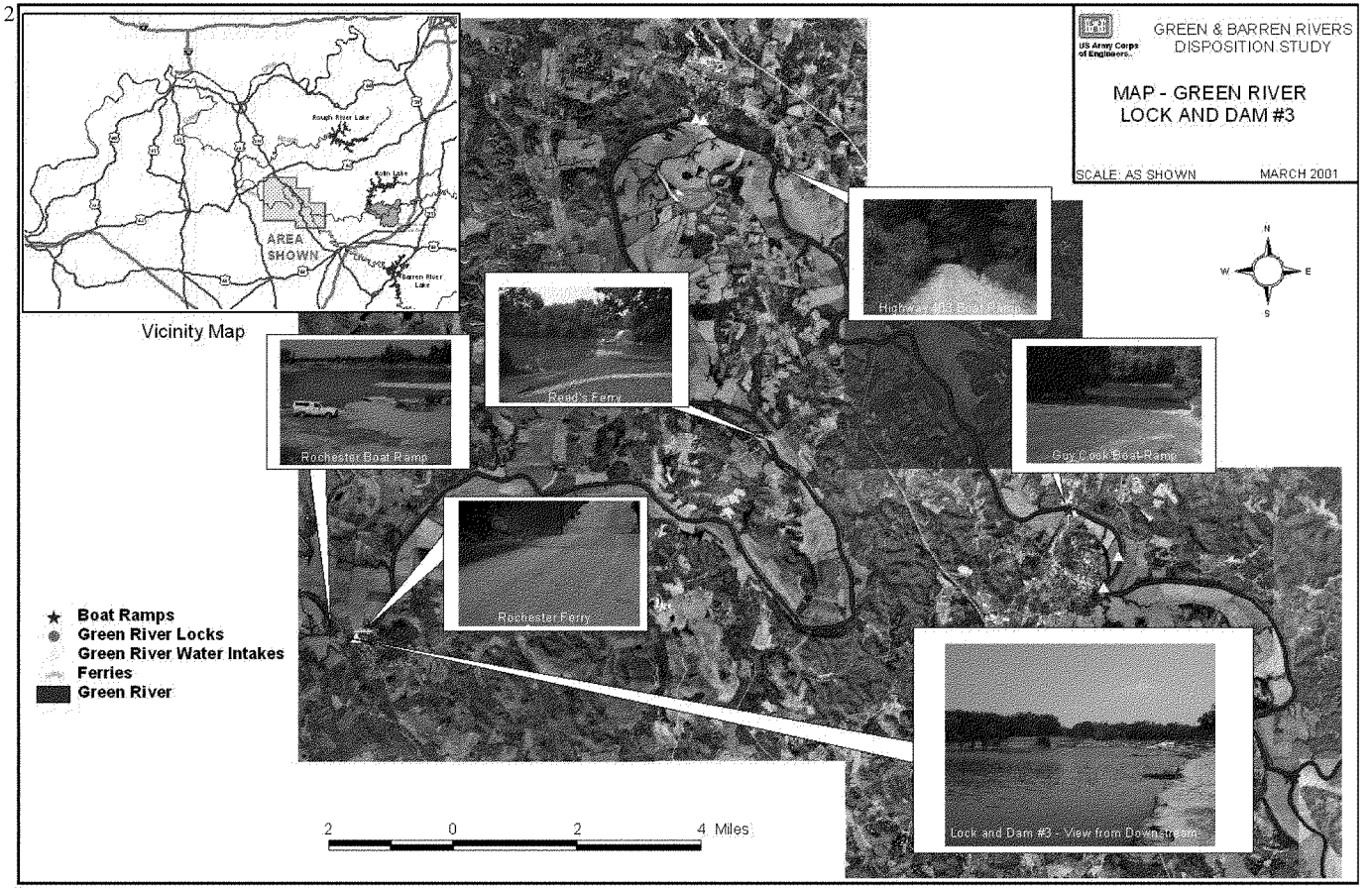
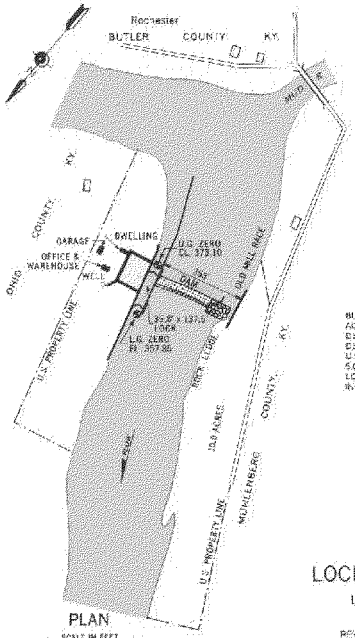

US Army Corps of Engineers
GREEN & BARREN RIVERS
DISPOSITION STUDY
MAP - GREEN RIVER
LOCK AND DAM #3
SCALE: AS SHOWN
MARCH 2001
Vicinity Map
AREA SHOWN
Rough River Lake
Kolin Lake
Barren River Lake
Rochester Boat Ramp
Read's Ferry
Guy Cook Boat Ramp
Rochester Ferry
Lock and Dam #3 - View from Downstream
N
W
E
S
Boat Ramps
Green River Locks
Green River Water Intakes
Ferries
Green River
2
0
2
4 Miles

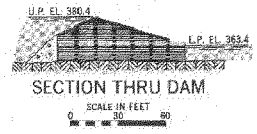
PLATE 3

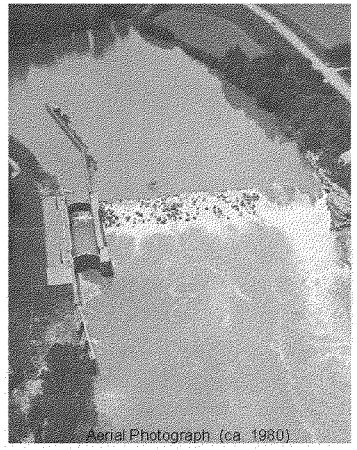


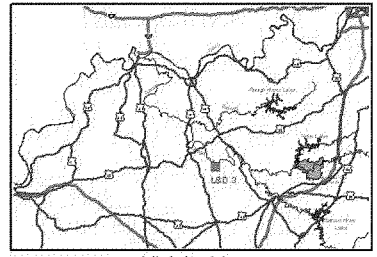
MILE 108.5
H.W. 414.2 (1937)
U.P. 380.4
L.P. 363.4
LIFT 17.0'

BUILT 1833-1836
ACQUIRED BY U.S. GOV'T. FEB 4, 1895
DEPTH ON UPPER MITER SILL 7.8'
DEPTH ON LOWER MITER SILL 5.8'
U.S. PROPERTY 11.71 ACRES FEE
5.01 ACRES PERMIT FOR FLOWAGE EASEMENT
LOCKING OPERATIONS WERE DISCONTINUED
IN SEPTEMBER 1981

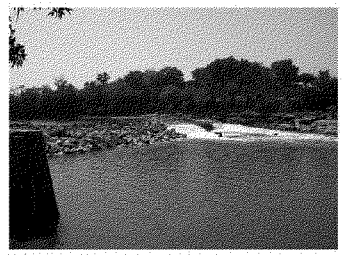
GREEN RIVER
LOCK & DAM NO. 3
LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1995




Aerial Photograph (ca. 1980)


Vicinity Map



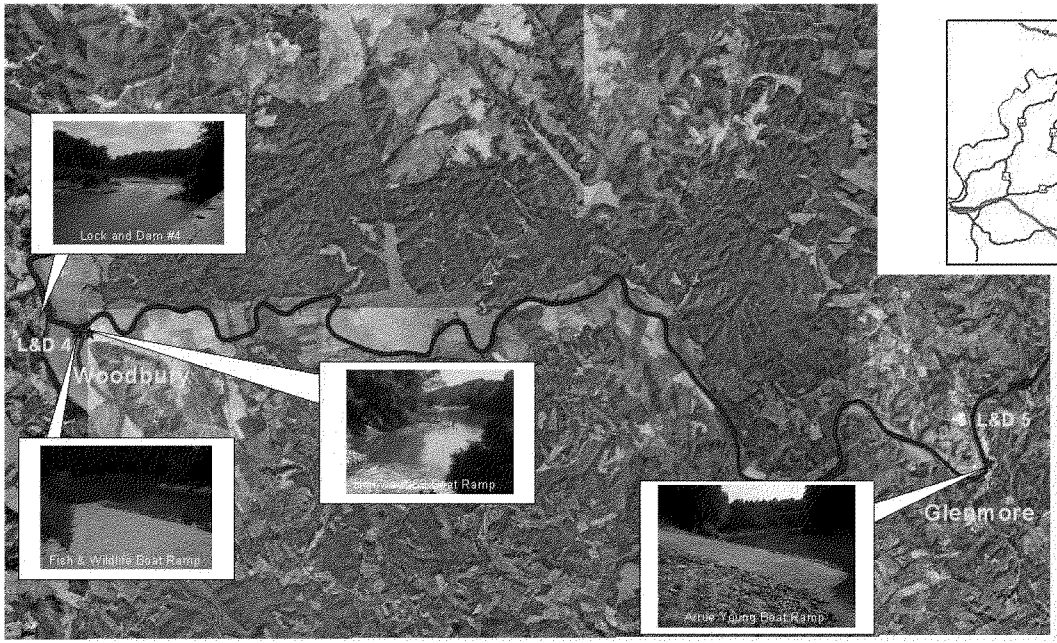


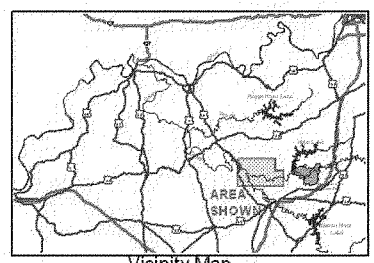
GREEN & BARREN RIVERS
DISPOSITION STUDY
US Army Corps of Engineers

MAP - GREEN RIVER
LOCK AND DAM #3

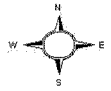
SCALE: AS SHOWN MARCH 2001

PLATE 4





Vicinity Map



- Ld4ramps.shp
- Green River Locks
- Ferries
- Green River

2 0 2 4 Miles

GREEN & BARREN RIVERS DISPOSITION STUDY

US Army Corps of Engineers.

MAP - GREEN RIVER LOCK AND DAM #4

SCALE: AS SHOWN MARCH 2001

PLATE 5

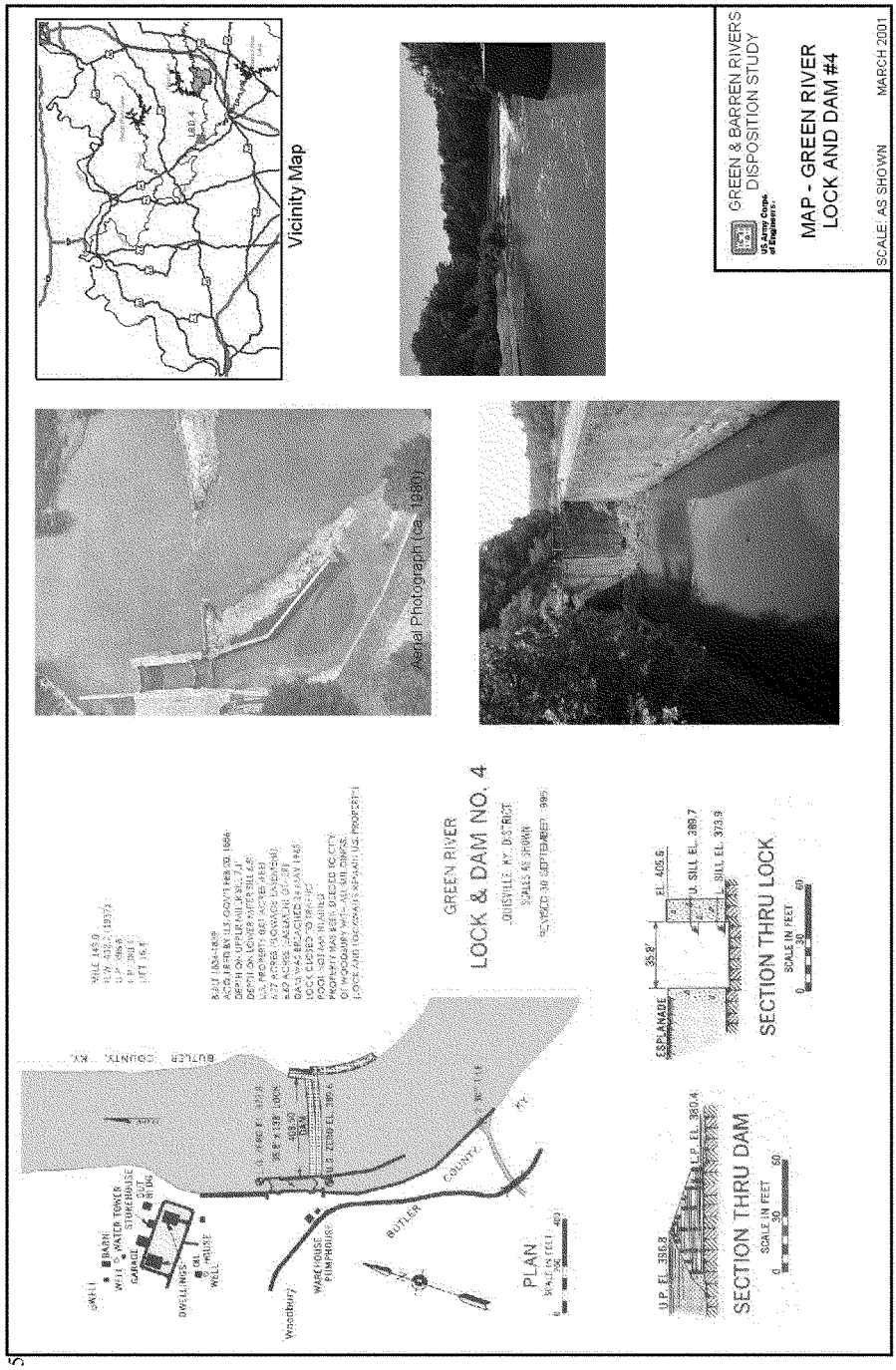

Vicinity Map
Aerial Photograph (ca. 1980)
GREEN & BARREN RIVERS
DISPOSITION STUDY
MAP - GREEN RIVER
LOCK AND DAM #4
SCALE: AS SHOWN
MARCH 2001
GREEN RIVER
LOCK & DAM NO. 4
OWENSBORO, KY. DISTRICT
SCALE AS SHOWN
PLAN
SECTION THRU DAM
SECTION THRU LOCK
ESPLANADE
BUTLER COUNTY, KY.

PLATE 6

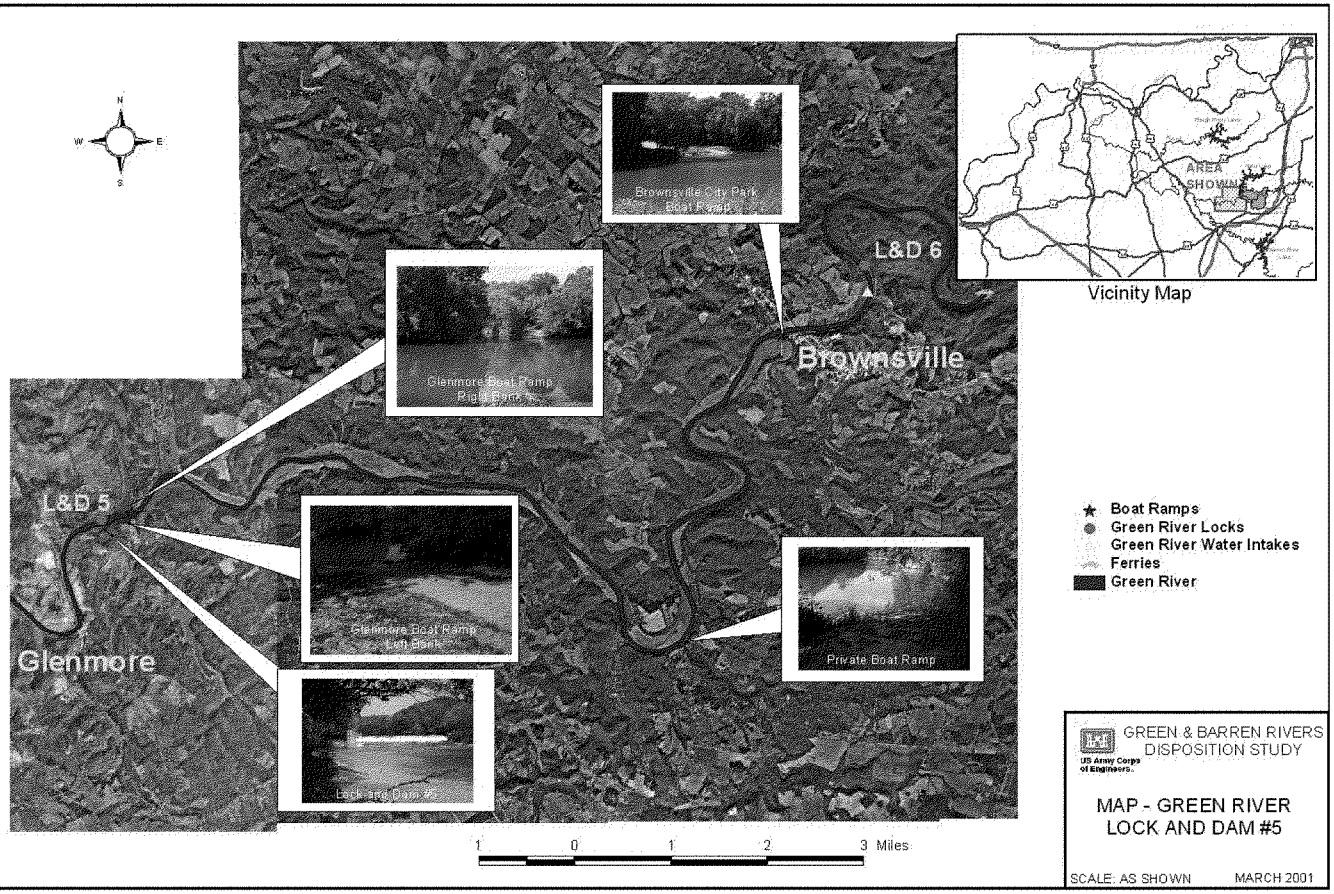
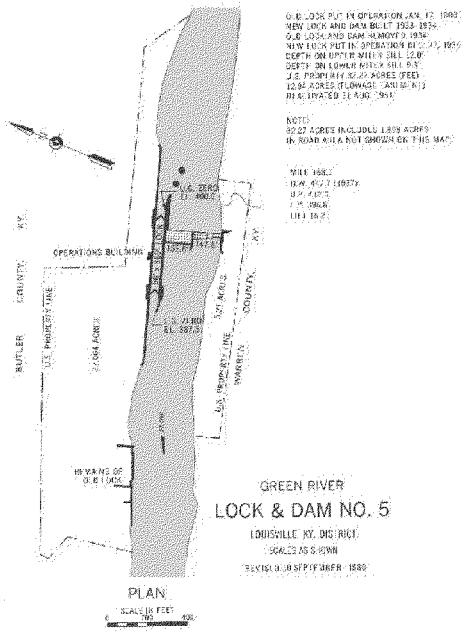
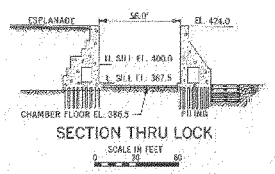
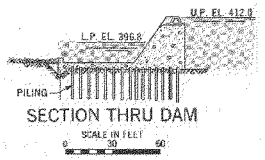

N
W
E
S
Brownsville City Park Boat Ramp
L&D 6
Brownsville
Glenmore Boat Ramp Right Bank
L&D 5
Glenmore Boat Ramp Left Bank
Glenmore
Private Boat Ramp
Lock and Dam #5
1 0 1 2 3 Miles
AREA SHOWN
Vicinity Map
Boat Ramps
Green River Locks
Green River Water Intakes
Ferries
Green River
US Army Corps of Engineers
GREEN & BARREN RIVERS DISPOSITION STUDY
MAP - GREEN RIVER LOCK AND DAM #5
SCALE: AS SHOWN
MARCH 2001

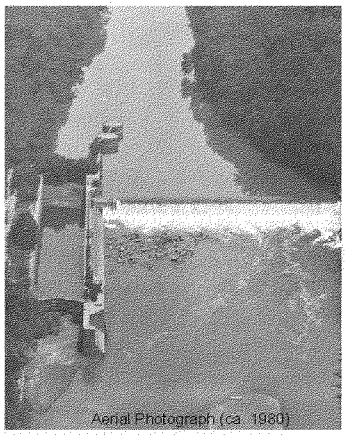
PLATE 7



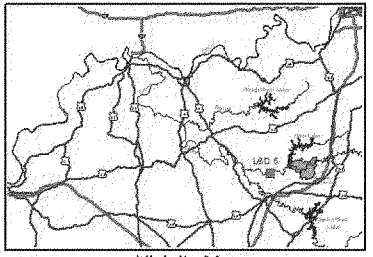
GREEN RIVER
LOCK & DAM NO. 5
LOUISVILLE KY. DISTRICT
SCALES AS S HOWN

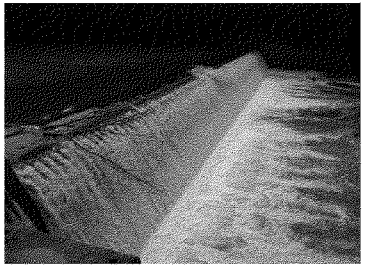





Aerial Photograph (ca. 1980)




Vicinity Map

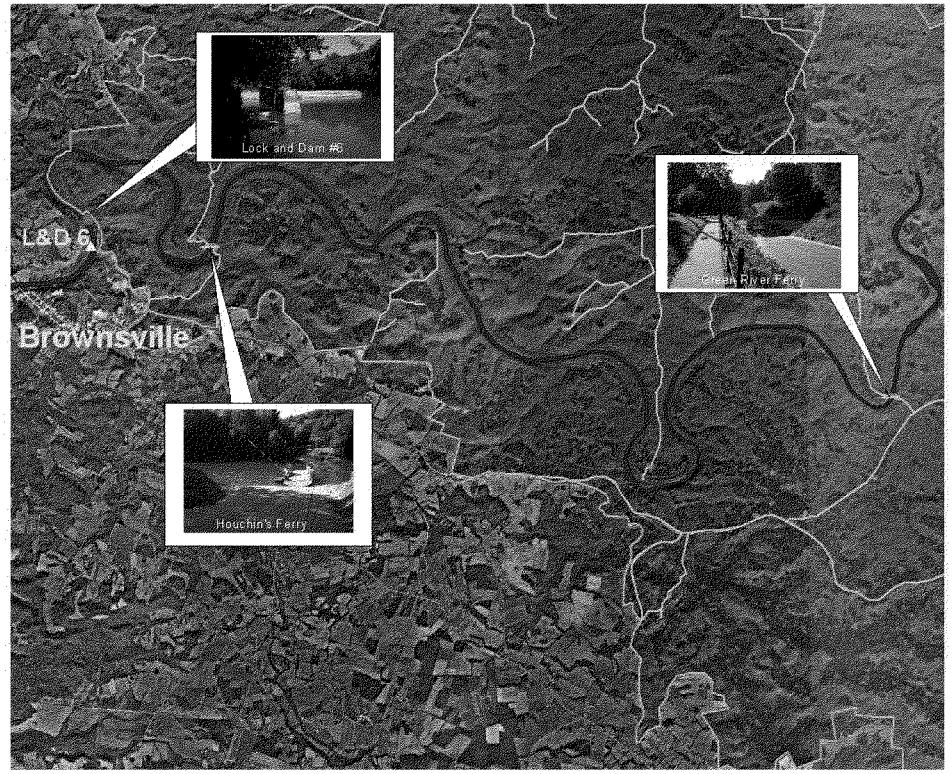


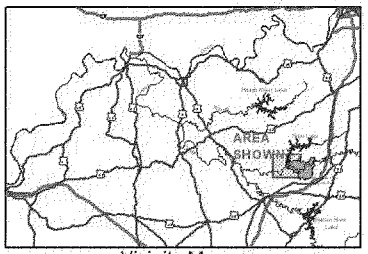
GREEN & BARREN RIVERS
DISPOSITION STUDY
US Army Corps of Engineers

MAP - GREEN RIVER
LOCK AND DAM #5

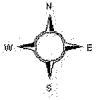
SCALE: AS SHOWN MARCH 2001

PLATE 8





Vicinity Map



- Boat Ramps
- Mammoth Cave National Park Boundary
- Green River Locks
- Green River Water Intakes
- Ferries
- Green River
- Road in Mammoth Cave National Park

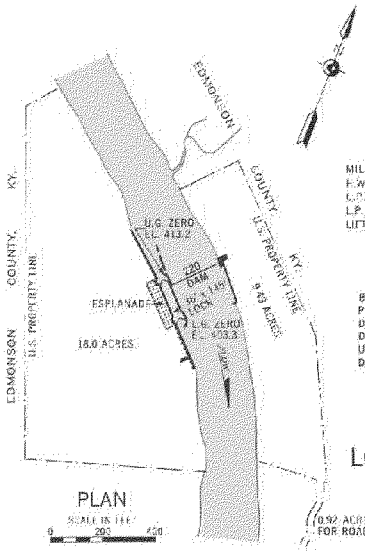
US Army Corps of Engineers.

GREEN & BARREN RIVERS DISPOSITION STUDY

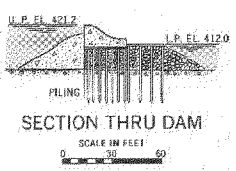
MAP - GREEN RIVER LOCK AND DAM #6

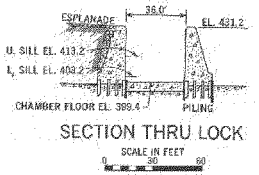
SCALE: AS SHOWN MARCH 2001

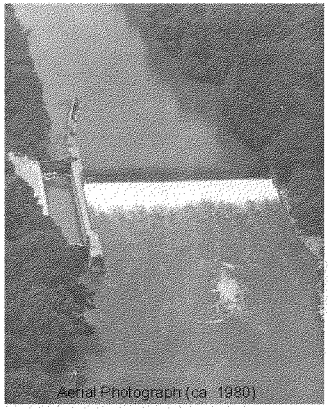
PLATE 9



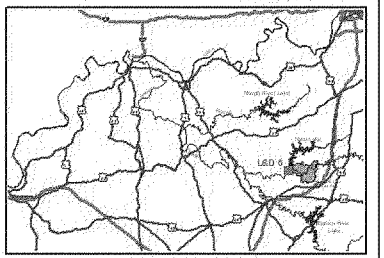
GREEN RIVER
LOCK & DAM NO. 6
LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1980



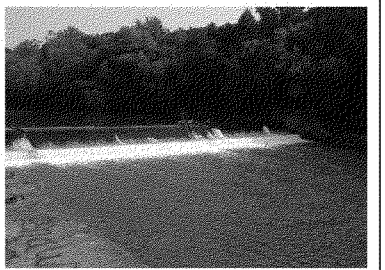



Aerial Photograph (ca. 1980)





Vicinity Map



GREEN & BARREN RIVERS DISPOSITION STUDY
US Army Corps of Engineers.

MAP - GREEN RIVER LOCK AND DAM #6

SCALE: AS SHOWN MARCH 2001

PLATE 10

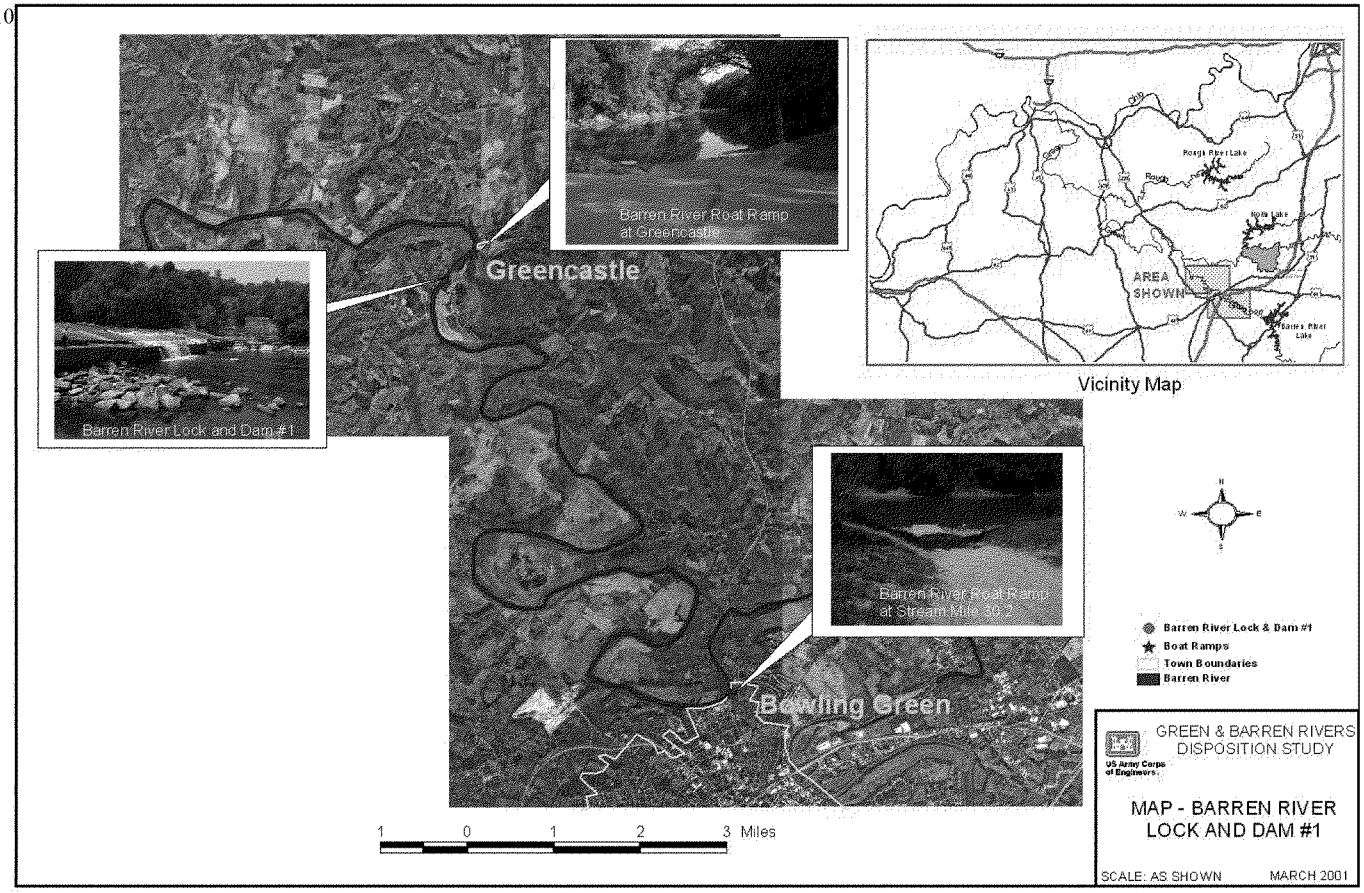
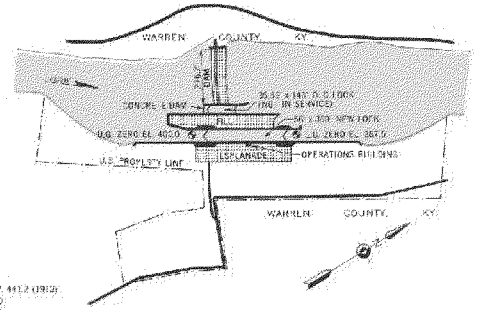

Barren River Boat Ramp at Greencastle
Greencastle
Barren River Lock and Dam #1
Vicinity Map
AREA SHOWN
Barren River Boat Ramp at Stream Mile 39.2
Bowling Green
Barren River Lock & Dam #1
Boat Ramps
Town Boundaries
Barren River
1 0 1 2 3 Miles
US Army Corps of Engineers
GREEN & BARREN RIVERS DISPOSITION STUDY
MAP - BARREN RIVER LOCK AND DAM #1
SCALE: AS SHOWN
MARCH 2001

PLATE 11



PLAN

SCALE IN FEET

BARREN RIVER

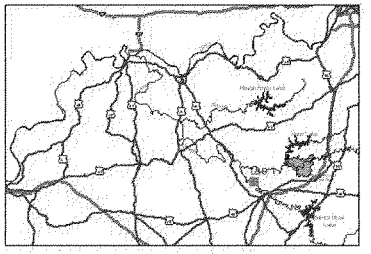
LOCK & DAM NO. 1

LOUISVILLE, KY. DISTRICT

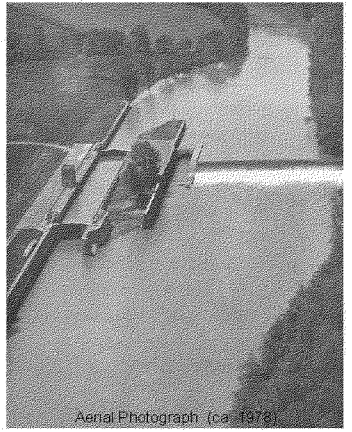
SCALE AS SHOWN

REVISED 30 SEPTEMBER 1978

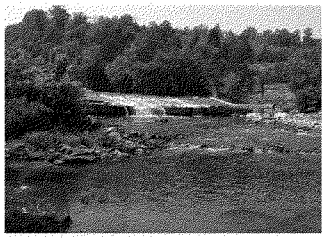


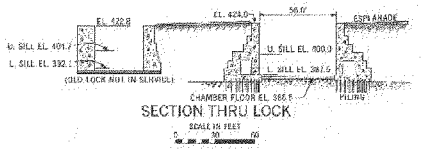


Vicinity Map



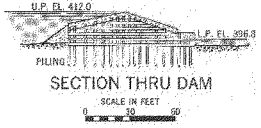
Aerial Photograph (ca. 1978)





SECTION THRU LOCK

SCALE IN FEET



SECTION THRU DAM

SCALE IN FEET

US Army Corps of Engineers.

GREEN & BARREN RIVERS DISPOSITION STUDY

MAP - BARREN RIVER LOCK AND DAM #1

SCALE: AS SHOWN MARCH 2001

Appendix A:
Cultural Resources Investigation

GREEN AND BARREN RIVERS NAVIGATION DISPOSITION STUDY
CULTURAL RESOURCES STUDIES

This appendix contains the following documents:

1. Kentucky State Historic Preservation Officer Letter dated 27 March 1998
2. Kentucky State Historic Preservation Officer Letter dated 13 September 2000
3. Kentucky State Historic Preservation Officer Letter dated 23 August 2001
4. Kentucky State Historic Preservation Officer Letter dated 26 March 2014
5. Phase 1 Cultural Resources Reconnaissance of Locks and Dams 3-6 on the Green River and Lock and Dam 1 on the Barren River, Kentucky – dated February 1998
6. Summary of History and Architecture of Green River Locks 3-6 and Barren River Lock 1, Kentucky – dated July 2000

Education, Arts and Humanities Cabinet

KENTUCKY HERITAGE COUNCIL
The State Historic Preservation Office

Paul E. Patton
Governor
Roy Peterson
Cabinet Secretary

David L. Morgan
Executive Director
and SHPO

March 27, 1998

Ms. Sharon M. Bond, Chief
Economics and Environmental
Resource Branch
Louisville District
U. S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Ms. Bond:

The State Historic Preservation Office has received for review and approval an archaeological survey report entitled "A Phase I Cultural Resources Reconnaissance of Locks and Dams 3-6 on the Green River and Lock and Dam 1 on the Barren River, Kentucky" by Donald B. Ball.

The survey found no evidence of prehistoric or early historic occupation in the project areas. Consequently, the proposed disposal of these tracts will have no effect on any archaeological site listed in or eligible for listing in the National Register of Historic Places.

The locks, dams, and associated standing structures are potentially eligible for listing in the National Register of Historic Places. In order to continue our review of this undertaking, will need information on the historic resources at each lock and dam. This information should include a brief history of each lock and dam supplemented with photographs of the lock chambers, the dams, and all the structures that are still existing at each facility. The age and function of each structure should be noted. This information should be presented in a professional historic resources report and submitted for our review. Upon review, we will advise the Corps of our eligibility findings and discuss appropriate recordation of resources determined to be eligible for the National Register.

Should you have any questions, feel free to contact Charles Hockensmith of my staff at (502) 564-7005.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer

cc: Mr. Donald B. Ball

300 Washington Street
Frankfort, Kentucky 40601
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FAX (502) 564-5820
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KENTUCKY HERITAGE COUNCIL
The State Historic Preservation Office

Paul E. Patton
Governor
Marlene M. Helm
Cabinet Secretary

David L. Morgan
Executive Director and
SHPO

September 13, 2000

U.S. Army Corps of Engineers, Louisville District
ATTN: PM-P-E
P.O. Box 59
Louisville, Kentucky 40201-0059

Re: Summary of History and Architecture of Green River Locks 3-6 and Barren River Lock 1
Butler, Edmonson, Ohio, and Warren Counties, Kentucky

Dear Mr. Shelton:

We have received the above referenced project, and have the following comments. We agree with the determination that the locks documented as part of this study are eligible for the National Register. We accept the completed documentation as part of the mitigation for the transfer of these properties. However, we would request that Kentucky Inventory Forms be completed on all the sites and that archival quality photographs be taken.

If you have any questions concerning these comments, please feel free to contact Jayne H. Fiegel of my staff at 502-564-7005, ext. 121.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer

300 Washington Street
Frankfort, Kentucky 40601

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The State Historic Preservation Office

Paul E. Patton
Governor
Marlene M. Helm
Cabinet Secretary

David L. Morgan
Executive Director and
SHPO

August 23, 2001

Ms. Jane C. Ruhl, P. E.
Project Manager
Planning Branch
Louisville District
U. S. Army Corps of Engineers
P.O. Box 59 ATTN: CELRL-PM-P
Louisville, Kentucky 40201-0059

Dear Ms. Ruhl:

The Kentucky Heritage Council has received for review a two volume document entitled "Navigation Disposition Study, Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1" prepared by the Louisville District. Both archaeological and historic surveys have been conducted and reviewed in the past. The archaeological study did not locate any archaeological sites. Likewise, the historic survey did not locate any significant on-shore historic properties. However, past consultation with the Louisville District has determined that Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 were eligible for listing in the National Register of Historic Places. The proposed disposition of Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam will have an adverse effect on these National Register eligible properties.

At their earliest convenience, the Louisville District should notify the Advisory Council on Historic Preservation of this undertaking. Also, Mammoth Cave National Park should be invited to participate in the Section 106 consultation. I would suggest that a meeting be scheduled including all consulting parties to determine appropriate mitigation measures and to develop a Memorandum of Agreement. Finally, no action should be taken to finalize the proposed treatment of the Locks and Dams until the consultation process is completed. We look forward to future consultation with the Louisville District. Should you have any questions, feel free to contact Charles Hockensmith of my staff at (502) 564-7005.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer

cc: Donald B. Ball

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Frankfort, Kentucky 40601
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STEVEN L. BESHEAR
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL

BOB STEWART
SECRETARY

THE STATE HISTORIC PRESERVATION OFFICE
300 WASHINGTON STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-5820
www.heritage.ky.gov

CRAIG A. POTTS
EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

March 26, 2014

U.S. Army Corps of Engineers, Louisville District
ATTN: Jan Marie Hemberger
PO Box 59
Louisville, KY 40201-0059

Re: Green and Barren River locks and dams disposition study

Dear Ms. Hemberger,

Our office has recently received the above referenced report and supporting documentation. The Corps is considering the feasibility of disposing of a number of lock and dam facilities. Preferred alternatives reflected in the study include a range of activities, from minor work on a number of facilities before removing them from federal ownership to demolition of Green River Lock and Dam 6.

In general, we continue to concur with the original findings presented in this report as they relate to eligiblity for listing in the National Register of Historic Places. We continue to agree that work proposed (including removing the facilities from federal ownership), will result in an adverse effect to historic properties. In accordance with 36 CFR Part 800, we also agree that consultation on a Memorandum of Agreement or Programmatic Agreement is the appropriate course of action to resolve adverse effects and ensure compliance with the National Historic Preservation Act.

Based on our review of the current study and recent discussions with your office, we recommend these additional items to consider as consultation moves forward:

When originally assessed for National Register eligibility, only the locks and dams were found eligible. In more than a decade since the original Corps studies were done, consultation on similar facilities on the Green River initiated by FERC and its license applicants have found on-shore buildings like extant lock tenders' houses to be contributing structures in a functionally related complex. Therefore, it would be advisable to update information on any extant buildings and structures at the locks and dams included in this Corps undertaking. Our office is willing to work with the Corps and consulting parties to assess the current condition and potential National Register eligibility of these resources at such time as the Memorandum of Agreement is being developed for the undertaking. We do not anticipate a need for further formal studies, but current photo documentation of the resources would be required.

Work proposed for Lock and Dam 6 likewise needs additional discussion, as the broadest range of possible effects may not have been considered in earlier studies. Specifically, nothing substantial is known about the existence of archaeological sites pre-pool, and we have concerns that sites may become exposed when water levels drop and the river returns to natural levels. We also have concerns that effects from dropping water levels in Mammoth Cave have not been thoroughly discussed. To address these issues, we recommend development of an inadvertent discovery plan outlining appropriate level of effort and measures for identifying and treating such sites after the undertaking has taken place. This would be written and incorporated into the Memorandum of Agreement. Because of his specific expertise on this area's resources, we recommend Dr. George Crothers, Director of the Office of State Archaeology, as a consulting party to participate in the Section 106 process moving forward. Other appropriate consulting parties may be identified when consultation resumes.

Finally, we would want consultation during development of the Memorandum of Agreement to include discussion about deed restrictions and/or other provisions to preserve the integrity of any historic properties which transfer out of federal ownership. If disposition of the properties is referred to GSA for sale with deed restrictions, we would still expect additional consultation with our office to ensure proper compliance with Section 106. It would be our position that if these properties are transferred or moved out of federal ownership, a Memorandum of Agreement would be needed regardless of the manner in which this happens.

The Louisville District Office has proposed Section 106 consultation and development of a Memorandum of Agreement be renewed after the approval of the Green and Barren Disposition Study and, if received, the appropriate authorization from Congress to deauthorize the lock and dam facilities. It is our understanding timing for the consultation would also be dependent on funding to undertake Section 106 consultation, design work for proposed activities, and/or disposal of the properties. The Section 106 consultation and execution of the agreement document would be completed prior to the commencement of any construction or demolition activities. As part of the Section 106 consultation process the Corps would notify the ACHP of the undertaking and any work which affects National Register eligible properties. We have no opposition to this approach. However, we strongly encourage the Corps to plan for an adequate period of time to complete the Section 106 process, allowing for meaningful consultation with our office and other consulting parties in development of the Memorandum of Agreement.

Thank you for the opportunity to comment. We look forward to working with you further. If you have any questions regarding these comments, please contact Jill Howe or Kary Stackelbeck of my staff at 502-564-7005, ext. 121 or 115, respectively.

Sincerely,

Craig A. Potts
Executive Director and
State Historic Preservation Officer

Cc: George Crothers
CP:jh

A PHASE I CULTURAL RESOURCES RECONNAISSANCE OF LOCKS AND DAMS 3-6 ON THE GREEN RIVER AND LOCK AND DAM 1 ON THE BARREN RIVER, KENTUCKY

U. S. ARMY CORPS OF ENGINEERS
LOUISVILLE DISTRICT
ATTN: CEORL-PD-R
P. 0. BOX 59
LOUISVILLE, KENTUCKY 40201-0059
TELEPHONE: (502) 582-5696
FAX: (502) 582-6734

FEBRUARY 1998

#2 Attachment (3)

NTIS FORM

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
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1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE February 1998	3. REPORT TYPE AND DATES COVERED Reconnaissance - January 1998	
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6. AUTHOR(S) Donald B. Ball			
7. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Corps of Engineer, Louisville District P. O. Box 59 (Attn: Planning Division) Louisville, KY 4020-0059			8. PERFORMING ORGANIZATION REPORT NUMBER
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A PHASE I CULTURAL RESOURCES RECONNAISSANCE OF LOCKS AND DAMS 3-6 ON THE GREEN RIVER AND LOCK AND DAM 1 ON THE BARREN RIVER, KENTUCKY

ABSTRACT

During the period January 20-23 and 26-30, 1998, a cultural resources examination was undertaken of Government property associated with Locks and Dams 3, 4, 5, and 6 along the Green River and Lock and Dam 1 on the Barren River in south-central Kentucky. These facilities cover a total of 101.874 acres (41.228 hectares). No evidence of either prehistoric or undisturbed historic era remains was encountered and no further archaeological studies are recommended on these parcels. The locks and dams *per se* are considered eligible for the National Register of Historic Places and the required level of recordation needed on these navigational facilities remains to be coordinated with the Kentucky State Historic Preservation Officer.

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A PHASE I CULTURAL RESOURCES RECONNAISSANCE OF LOCKS AND DAMS 3-6 ON THE GREEN RIVER AND LOCK AND DAM 1 ON THE BARREN RIVER, KENTUCKY

I. INTRODUCTION

A Phase I cultural resources reconnaissance was undertaken during the period January 20-23 and 26-30, 1998, of a series of five now closed locks and dams along the reaches of the upper Green River system of central Kentucky. Specifically, these facilities are Locks and Dams 3-6 on the Green River proper, and Lock and Darn I on the Barren River (Figure 1), a tributary stream. This effort supplements previous on-site inspections of these facilities undertaken in the mid-1980s and 1989-1990.

Each of these government facilities has been deactivated for an extended period (some as early as 195 1) and is proposed for disposal. As will be discussed below in greater detail, the majority of structures associated with these facilities have been demolished and maintenance is limited to limited to occasional mowing at Locks and Dams 3 and 4 on the Green River and Lock and Darn I on the Barren River.

II. PROJECT LOCATION

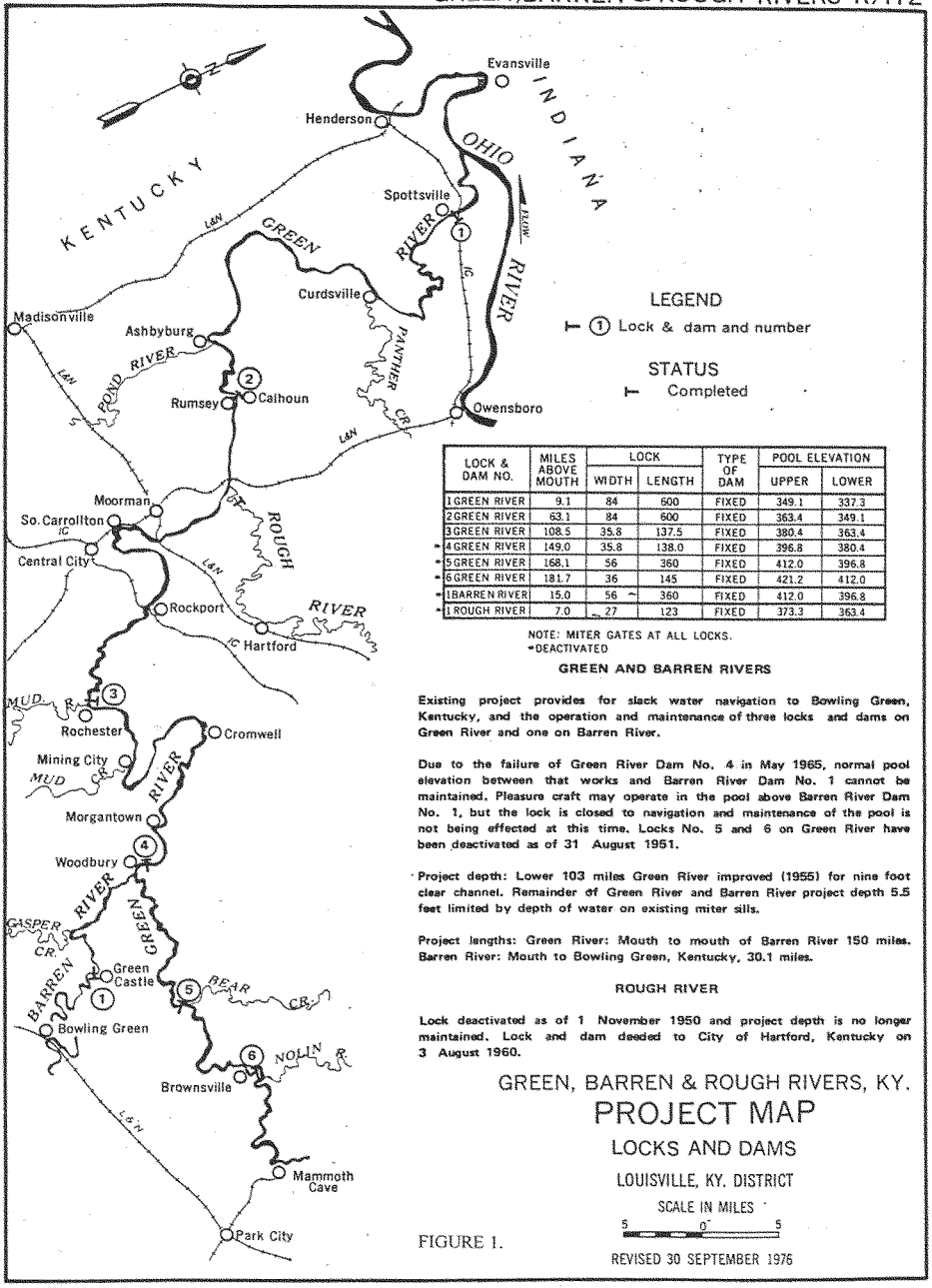
Derived from headwaters originating in the Dripping Springs Escarpment, the Green River traverses a generally southeast to northwest route through the Western Kentucky Coal Field physiographic region (cf. McGrain and Currens 1978). The topographic setting of the examined facilities varies from relatively constricted valley in the area of locks and dams 5 and 6 to the broad floodplain surrounding Lock and Darn 3 near Rochester. In terms of the contemporary cultural landscape, each facility is located in an area, which may be termed rural.

III. SURVEY PREDICTIONS

As one aspect of various preliminary environmental studies undertaken in conjunction with prior (1989-1990) studies of the general study area by the Corps of Engineers, a review was undertaken of available cultural resources information relevant to known prehistoric and historic sites and properties adjacent to the Green (RM. 108.5 -168.1) and Barren (RM 0.0-30.0) rivers. Specifically, this information was obtained from the files of the Kentucky Office of State Archaeology, a listing of Green and Barren Rivers landmarks on Me with the Louisville District, -and an historical study of the Green River Valley authored by Harralson (1981). Further, it is noted that this information reflects sites or properties situated immediately adjacent to, or with 500 feet of, the extant banks of the Green and Barren rivers, and a maximum of 20 feet above normal river levels.

The majority of the recorded sites within the study area are prehistoric in origin although a lesser number of historic era properties (riverboat, ferry, and wharf landings) are known within the area. Information on file with the Kentucky Office of State

GREEN, BARREN & ROUGH RIVERS R/H 2



LOCK & DAM NO.	MILES ABOVE MOUTH	LOCK WIDTH	LOCK LENGTH	TYPE OF DAM	POOL ELEVATION UPPER	POOL ELEVATION LOWER
1 GREEN RIVER	9.1	84	600	FIXED	349.1	337.3
2 GREEN RIVER	63.1	84	600	FIXED	363.4	349.1
3 GREEN RIVER	108.5	35.8	137.5	FIXED	380.4	363.4
*4 GREEN RIVER	149.0	35.8	138.0	FIXED	396.8	380.4
*5 GREEN RIVER	168.1	56	360	FIXED	412.0	396.8
*6 GREEN RIVER	181.7	36	145	FIXED	421.2	412.0
*1 BARREN RIVER	15.0	56	360	FIXED	412.0	396.8
*1 ROUGH RIVER	7.0	27	123	FIXED	373.3	363.4

NOTE: MITER GATES AT ALL LOCKS.
*DEACTIVATED

GREEN AND BARREN RIVERS

Existing project provides for slack water navigation to Bowling Green, Kentucky, and the operation and maintenance of three locks and dams on Green River and one on Barren River.

Due to the failure of Green River Dam No. 4 in May 1965, normal pool elevation between that works and Barren River Dam No. 1 cannot be maintained. Pleasure craft may operate in the pool above Barren River Dam No. 1, but the lock is closed to navigation and maintenance of the pool is not being effected at this time. Locks No. 5 and 6 on Green River have been deactivated as of 31 August 1951.

Project depth: Lower 103 miles Green River improved (1955) for nine foot clear channel. Remainder of Green River and Barren River project depth 5.5 feet limited by depth of water on existing miter sills.

Project lengths: Green River: Mouth to mouth of Barren River 150 miles. Barren River: Mouth to Bowling Green, Kentucky, 30.1 miles.

ROUGH RIVER

Lock deactivated as of 1 November 1950 and project depth is no longer maintained. Lock and dam deeded to City of Hartford, Kentucky on 3 August 1960.

GREEN, BARREN & ROUGH RIVERS, KY.

PROJECT MAP

LOCKS AND DAMS

LOUISVILLE, KY. DISTRICT

SCALE IN MILES

5 0 5

REVISED 30 SEPTEMBER 1976

FIGURE 1.

Archaeology indicates that the entirety of this area has not been systematically examined for cultural resources. A quantified summary of known cultural resources by pool reach is presented in **Table 1**.

TABLE 1. QUANTIFIED SUMMARY OF KNOWN CULTURAL RESOURCES ADJACENT TO POOLS OF GREEN RIVER LOCKS AND DAMS 2 (UPPER POOL), 3, AND 4, AND. BARREN RIVER (MOUTH TO BOWLING GREEN)

Pool	Prehistoric Sites	Historic Sites	Pool Total
Green River –Pool #2 (upper reaches only) (RM 102.5-108.5)	3	2	5
Green River - Pool #3 (RM 108.5-149.0)	30	24	54
Green River - Pool #4 (RM 149.0-168.1)	7	13	20
Lower Barren River (RM 0.0-15.0)	6	3	9
Barren River - Pool #1 (RM 15.0-Bowling Green)	11	2	13
TOTALS	57	44	101

Reasonable archaeological expectations for the environs of the examined Government parcels are numerous prehistoric sites (of which the region's Shell Mound Archaic is likely the best known), historic era farmsteads, and riverboat landings. In addition to the sites enumerated in Table 1, it is noted that Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Darn 1 are considered eligible for listing in the National Register of Historic Places. The disposition of these facilities (and such support structures as are still standing), as well as all other cultural resource matters, must be fully coordinated with the Kentucky State Historic Preservation Officer.

IV. COMPLIANCE REQUIREMENTS

This archaeological investigation was conducted in compliance with Public Law 91-190 (NEPA), Public Law 89-665 (National Historic Preservation Act of 1966 as amended, 16 U. S. C. 470 D, Public Law 96-95 (Archeological Resources Protection Act of 1979), and Presidential Executive Order 11593. This project complies with the

specifications for field investigations and National Register of Historic Places assessment by the Secretary of the Interior (1983) and the Kentucky State Historic Preservation Office (Kentucky Heritage Council 1991).

V. FIELD METHODS

At the time of the reconnaissance, the preponderance of the projects' elements was variously covered with thick lawn, dense weeds, and/or secondary growth forest. Surface visibility was typically but 2-3% though some areas (animal burrows, road ruts resulting from unauthorized four wheel drive usage, and erosional gullies, and exposed river bank.

The field methods utilized in the conduct of the present reconnaissance effort were both systematic and straightforward. Dependent upon the nature of the subject terrain, the project elements were examined by means of pedestrian transacts supplemented where appropriate by shovel testing at 40-50 foot (12-15 meter) intervals in areas displaying little or no visual indication of prior disturbance. Where excavated, shovel tests were approximately 10 inches (25 cm) square and extended to a depth of ca. 6-8 inches (15-20 cm). Such test pits variably revealed a shallow humus zone directly above sterile soil or, alternately, mottled soil indicative of prior earth moving activities.

VI. PROJECT ELEMENT DESCRIPTIONS AND SURVEY FINDINGS

Four of the subject Federal facilities are located along the reaches of the Green River Valley from river mile 108.5 (Lock and Dam 3 near Rochester) to mile 181.7 (Lock and Dam 6 near Brownsville). The fifth facility inspected was Lock and Dam 1 on mile 15.0 of the Barren River, a tributary which enters the Green River just upstream of Lock and Darn 4 at mile 149.0 at Woodbury. A summary of mile locations, facility chronologies, areas, and counties in which these parcels are located appears as **Table 2**. Each will be discussed below.

Green River Facilities

Lock and Dam 3 (**Figure 2**) The lock side of this facility is situated on a floodplain at river mile 108.5 near the community of Rochester. At least two acres surrounding the remnants of the structural complex has been raised ca. 2-3 feet, likely by the deposition of spoil resulting from initial dam construction.

Though a two-story frame dwelling was destroyed by arson in the early 1990s and other support structures have likely been demolished, three structures remain on this tract.

These are:
1. Garage - ca. 20 x 25 ft, lumber frame with sheet metal siding;
2. Office and warehouse - ca. 20 x 20 ft, lumber frame with sheet metal siding; and
3. Dwelling - ca. 25 x 40 ft, one story brick with basement.

All have been extensively tooted (particularly the dwelling) and vandalized.

TABLE 2. LOCATIONAL, CHRONOLOGICAL, AND ACREAGE DATA FOR EXAMINED FACILITIES

River/Facility	River Mile	Chronology	Lock Side - Area/County	Abuttment Side - Area/County
Green River (moving upstream)				
Lock and Darn 3	108.5	Built 1833-1836; Deactivated 1960s	6.72 (2.72)* - Ohio	10.0 (4.05) – Muhlenberg
Lock and Darn 4	149.0	Built 1834-1839; Loss of pool 1965	3.63 (1.47) - Butler	1.66 (0.67) – Butler
Lock and Darn 5	168.1	Old lock 1900-1934; New lock built 1933-1934; Deactivated 1951	27.064 (10.95) - Butler	5.21(2.11) – Warren
Lock and Darn 6	181.7	Built 1904-1905; Deactivated 1951	18.0 (7.28) - Edmonson	9.49 (3.84) – Edmonson
Barren River				
Lock and Darn 1	15.0	Old lock 1841-1934; New lock built 1933-1934; Deactivated 1965	20.1 ac - Warren	-0- Warren

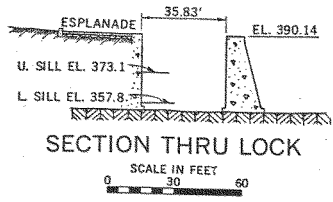
* Acres (hectares)

Total area of Government property = 101.874 acres (41.228 hec).

Shovel test pits yielded only sporadic clear glass fragments, wire nails, miscellaneous plastic, and obviously modem debris (much of it fishing related). An inspection of the exposed bank produced no evidence of early cultural materials.

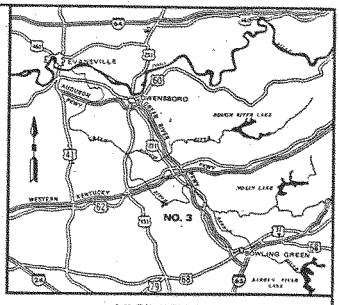
The abutment portion of the facility is currently used as a park by Muhlenberg County. Much of this tract consists of a sizable exposed lock ledge. The balance of the floodplain encompassed by the parcel has been covered with deep gravel or asphalt to facilitate parking by area boaters and fishermen. As the project map shows an "old mill race" in this area, a particular effort was made to examine this location. No structural or artifactual evidence was observed to suggest the presence of a substantive building in this area. The likely site of the mill foundation just inland from the riverbank has been graded and paved.

GREEN RIVER R/H 5-2



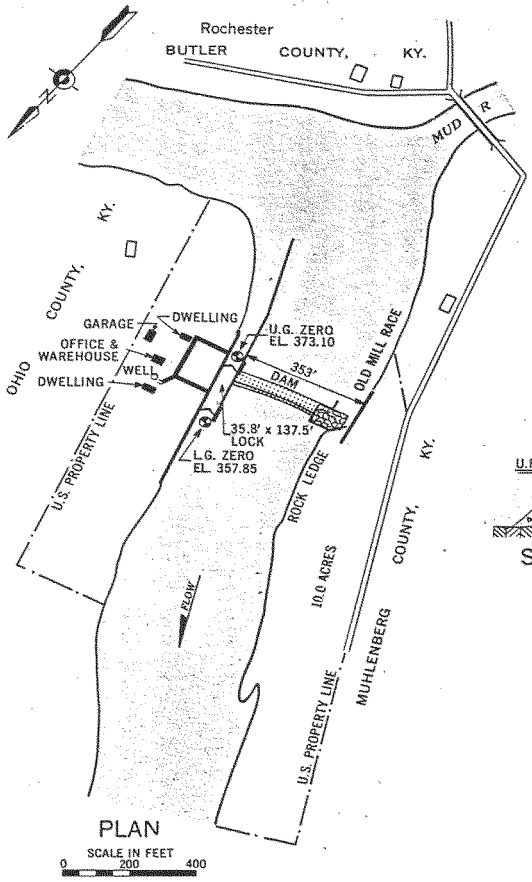
SECTION THRU LOCK

SCALE IN FEET
0 30 60



VICINITY MAP

SCALE IN MILES
0 10 20 30 40



PLAN

SCALE IN FEET
0 200 400

MILE 108.5
H.W. 414.2 (1937)
U.P. 380.4
L.P. 363.4
LIFT 17.0'

BUILT 1833-1836
ACQUIRED BY U.S. GOV'T. FEB. 4, 1895
DEPTH ON UPPER MITER SILL 7.3'
DEPTH ON LOWER MITER SILL 5.6'
U.S. PROPERTY 16.72 ACRES FEE



SECTION THRU DAM

SCALE IN FEET
0 30 60

GREEN RIVER

LOCK & DAM NO. 3

LOUISVILLE, KY. DISTRICT

SCALES AS SHOWN

REVISED 30 SEPTEMBER 1981

FIGURE 2.

An examination of the exposed bank profile revealed no in situ prehistoric or historic era deposits. Evidence was noted of 20th century over bank dumping activities. Materials observed along the bank and shore included one Champion spark plug ceramic core, one three hole machine made brick (no marker's mark), three green glass embossed Coca-Cola bottles fragments (produced 1916-1957), miscellaneous plastic, clear and brown glass bottle sherds, and other debris.

Lock and Dam 4 **(Figure 3)**. The lock side of this facility is situated in the community of Woodbury at mile 149.0. This facility was shut down when its aging rock filled wood crib darn breached on May 24, 1965, and the pool was lost. Some property has been sold since that date. The bulk of the remnant land holding is relatively steep (25+ degrees) or obviously terraced and therefore previously disturbed.

In the intervening years, the lock workers houses have been sold or transferred by the Government (one now serves as a local museum). Only two structures remain at this facility. These are:

1. Warehouse - ca. 30 x 30 ft, one story frame, pyramidal roof, currently used as local civic center; and
2. Pumphouse - ca. 10 x 12 ft, brick, gable roof oriented to long axis, door in center of short axis wall, typical "shed" floorplan.

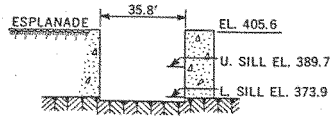
Shovel testing in the elevationally low lying up- and downstream portions of the lock side tract consistently revealed evidence of heavy siltation from flood episodes. Notably, in the context of the settlement and development of historic Woodbury, tracts at similar elevations have been generally avoided as construction sites. Limited numbers of bent nails, clear glass bottle sherds, and plastic fragments were noted. No artifactual concentrations were observed. No materials were observed along the accessible portions of the exposed bank.

The low lying abutment parcel had been examined during the course of a visit to this lock and darn in the mid-1980s. Shovel testing on this floodplain tract revealed only extensive deposits of silt containing only minor amounts of recent debris (aluminum beverage cans, plastic, etc.).

Lock and Darn 5 **(Figure 4).** The lock side of this facility is situated at river mile 168.1 near the confluence of Bear Creek and the Green River. During its active career, two locks have stood at this tract. The earliest, placed in operation in January of 1900, subsequently developed major structural problems. and was replaced by a second unit constructed from 1933-1934. The earlier dam was demolished in 1934 at which time the newer facility went into use. The second dam was deactivated on August 31, 1951.

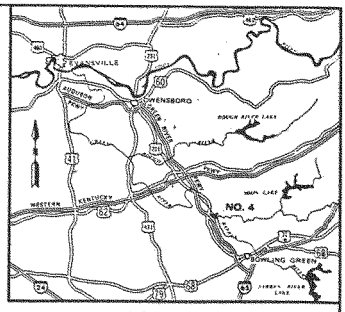
This lock and dam is situated in a relatively constricted portion of the upper Green River Valley. The portion of the facility paralleling the river is floodplain. The inland zone of the parcel rises abruptly to a terrace formation ca. 35 ft above the floodplain. Lock workers houses, and all frame support structures and roads have been demolished at this

GREEN RIVER R/H 6-2



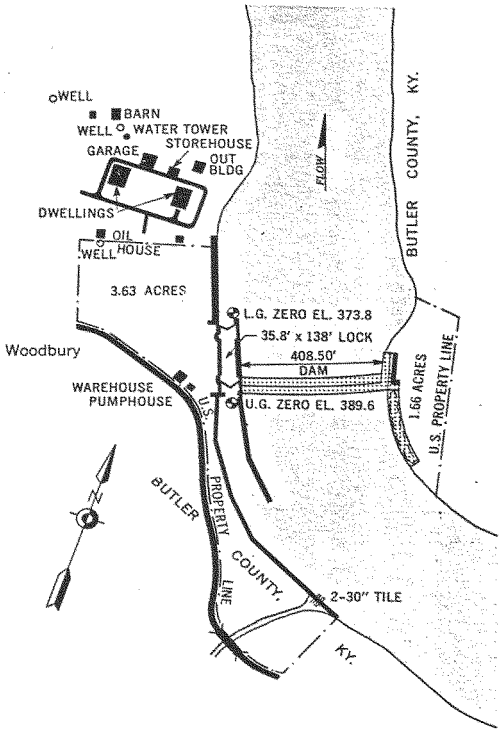
SECTION THRU LOCK

SCALE IN FEET
0 30 60



VICINITY MAP

SCALE IN MILES
0 10 20 30 40



PLAN

SCALE IN FEET
0 200 400



SECTION THRU DAM

SCALE IN FEET
0 30 60

MILE 149.0
H.W. 432.7 (1937)
U.P. 396.8
L.P. 380.4
LIFT 16 4'

NOTE:
BUILT 1834-1839
ACQUIRED BY U.S. GOV'T. FEB. 20, 1886
DEPTH ON UPPER MITER SILL 7.1'
DEPTH ON LOWER MITER SILL 6.5'
U.S. PROPERTY 5.29 ACRES (FEE)
6.27 ACRES (FLOWAGE EASEMENT)
6.62 ACRES (EASEMENT OTHER)
DAM WAS BREACHED 24 MAY 1965
LOCK CLOSED TO TRAFFIC,
POOL NOT MAINTAINED

GREEN RIVER

LOCK & DAM NO. 4

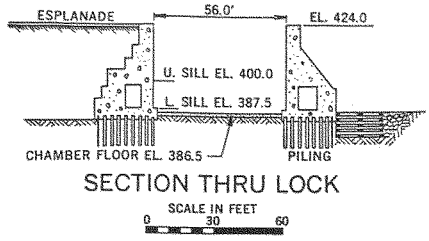
LOUISVILLE, KY. DISTRICT

SCALES AS SHOWN

REVISED 30 SEPTEMBER 1980

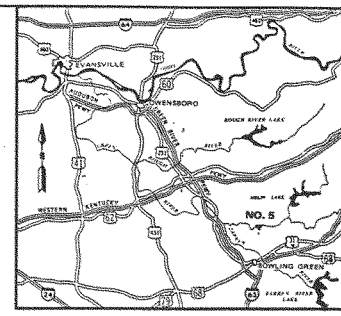
FIGURE 3.

GREEN RIVER R/H /-2



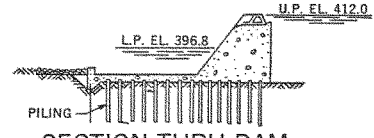
SECTION THRU LOCK

SCALE IN FEET
0 30 60



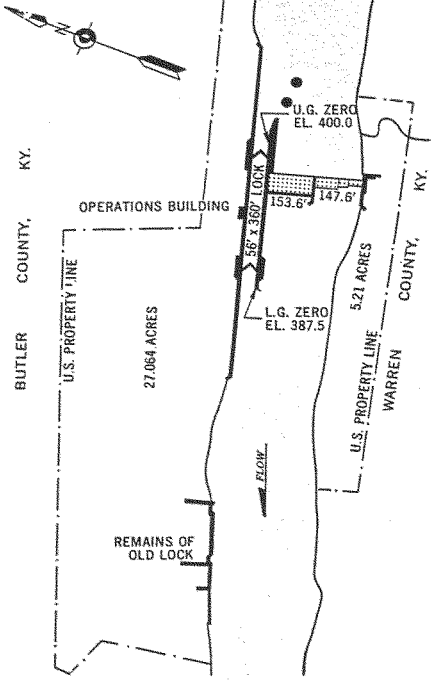
VICINITY MAP

SCALE IN MILES
0 10 20 30 40



SECTION THRU DAM

SCALE IN FEET
0 30 60



PLAN

SCALE IN FEET
0 200 400

MILE 168.1
H.W. 447.7 (1937)
U.P. 412.0
L.P. 396.8
LIFT 15.2'

OLD LOCK PUT IN OPERATION JAN. 17, 1900
NEW LOCK AND DAM BUILT 1933-1934
OLD LOCK AND DAM REMOVED 1934
NEW LOCK PUT IN OPERATION DEC. 22, 1934
DEPTH ON UPPER MITER SILL 12.0'
DEPTH ON LOWER MITER SILL 9.3'
U.S. PROPERTY 32.27 ACRES (FEE)
12.94 ACRES (FLOWAGE EASEMENT)
DEACTIVATED 31 AUG. 1951

NOTE:
32.27 ACRES INCLUDES 1.898 ACRES
IN ROAD AREA NOT SHOWN ON THIS MAP.

GREEN RIVER

LOCK & DAM NO. 5

LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1980

FIGURE 4.

facility. The only remaining structure is a two-story steel reinforced, poured concrete operations building. This structure measures ca. 20 x 25 R. Situated immediately adjacent to the lock, this structure has been extensively vandalized. The first floor had piles of silt up to ca. 2 ft high showing the effects of numerous flood episodes. The gates to the lock are clogged with ca. 18 ft of flood deposited silt. Trees in this silted area have grown to a height of ca. 40 ft.

The foundational remnants of four support structures were noted just above, along the surface of, and atop the forward crest of the floodplain/first terrace interface near the area of the now demolished "old" lock. These remains were interpreted as follows.

Dwelling Area #1
1. Poured concrete steps ascending ca. 25-30 ft from the floodplain to the crest of the terrace.

Dwelling Area #2
2. Garage - situated at rearward edge of floodplain ca. 10 x 15 ft, roughly fashioned from local fieldrock (sandstone?), located near route of facility road.
3. Poured concrete steps and flat landing, possible foundation for wooden access stair up the terrace face, steps elevationally situated ca. 10 ft above the base of the terrace slope.
4. "Spring house". This humble foundation was likely the most interesting structural remnant encountered on the property. Situated at the forward face of the terrace, this structure represented an almost unique adaptation to local topographic conditions and spatial constraints and warrants some additional degree of discussion. The remain (foundational) portion of the structure is flush with the existing ground surface. These walls (inner dimensions of ca. 4 x 8 ft) are constructed of competently hewn limestone (?). Though of variable length, they are ca. 9 inches thick and ca. 11 inches wide. The resultant bond pattern is irregular. The wall stands four courses high and an exposed area beneath the lower course of stones near the southern ("downhill") short axis wall suggests that it rests on a footer of crude fieldrock. A short (5 ft) row of stone blocks parallels the southern short axis wall at a distance of ca. 3 ft. These may have served as supports for an extended roof.

Clearly visible in both the northern ("uphill") and opposing short axis walls were two ca. 12 inches red clay ceramic drainage pipes, one serving to direct water into the stone chamber and the other directing water out and downhill. The uppermost edge of the in- take pipe was ca. 2 ft below ground surface. The outflow pipe was ca. 3 ft below the surface. Much of the northern half of the floor was mounded with leaves and silt almost flush with the top of the in-take pipe. This debris may have obscured interior access steps.

In these general dimensional and construction details, this spring house is comparable to others encountered throughout the region. It differs, however, in that this traditional style of construction was built in terrain specifically altered to accommodate it. The source of water for the spring house was not a spring per se. Rather, water had been diverted via the ceramic pipe from an adjacent seasonal stream into the structure which
was dug into an area of extensive fill which had been dumped over the face of the terrace. This effort had required the placement of several hundred cubic feet of soil and the creation of an artificial platform which extended about 12 ft beyond the terrace face. This platform sloped abruptly downward at about 45 degrees. The water exiting the spring house flowed downhill and

entered a Corps of Engineers installed drainage system. Shovel testing around the spring house yielded only two fragments of clear container glass.

Shovel testing on the lock side parcel revealed only limited numbers of bent nails, clear glass bottle sherds, and plastic fragment. No artifactual concentrations were observed. No materials were observed along the accessible portions of the exposed bank.

The opposing abutment parcel rises rapidly from the river's edge at 25 degrees or more. This area had been previously examined during the course of a visit to this lock and dam in the mid-1980s. Limited shovel testing on this tract revealed only culturally sterile soil. Minor amounts of recent debris (aluminum beverage cans, plastic, etc.) were noted along the bank.

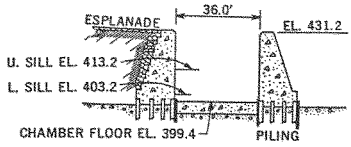
Lock and Darn 6 **(Figure 5)**. The lock side of this facility is situated near the community of Brownsville at mile 181.7. Constructed in the period 1904-1905, this facility was deactivated in August 1951. In common with the topography encountered at Lock and Dam 5, the setting of this facility is in a relatively constricted portion of the Green River Valley. The central portion of the tract's floodplain appears to have been built up with spoil earth to a height of 3 or 4 ft. There are no standing structures on this parcel. The lower (downstream) lock gates have fallen off their hinges. The upper gates have been sealed with a substantial poured concrete wall. The tract is in an advance state- of reforestation and surface visibility was typically zero percent. Some visibility was afforded by a number of four wheel drive tracks across the grounds.

Shovel test pits generally revealed extensive recent siltation near the up- and downstream portions of the tract. In the central (built up) area near the lock, testing revealed mottled (disturbed) earth resulting from prior construction and demotion episodes. In addition to obviously modem materials, sporadic examples of clear, brown, and green container glass, rusted wire nails, and other debris were noted in this area. No in situ materials were observed along accessible portions of the exposed banks.

I

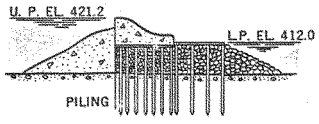
The opposing abutment parcel encompasses a very narrow (ca. 35 ft) floodplain which has been graded and filled at some point in the past for use as a local access road. The bulk of the property is ca. 35-45 degree slope. This area had been previously examined during the course of a visit to this lock and dam in the mid-1980s. Limited shovel testing on this tract revealed only culturally sterile soil. Minor amounts of recent debris (aluminum beverage cans, plastic, etc.) were noted along the bank, most of which is heavily rip-rapped from the dam downstream to the terminus of the Government parcel.

GREEN RIVER R/H 8-2



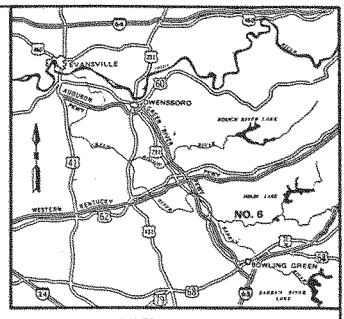
SECTION THRU LOCK

SCALE IN FEET
0 30 60



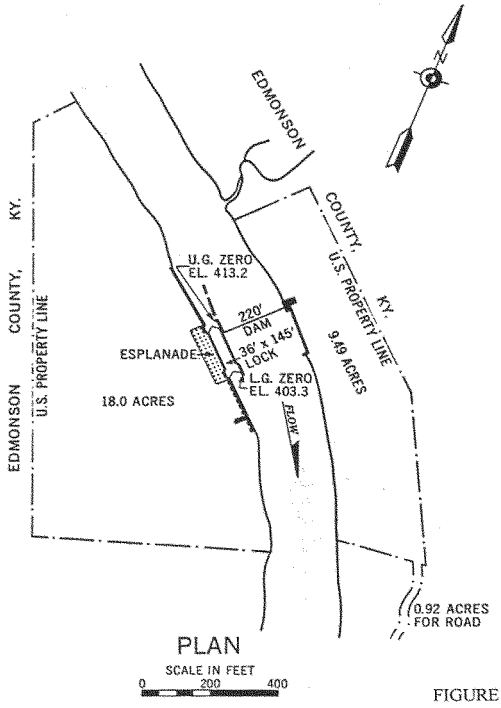
SECTION THRU DAM

SCALE IN FEET
0 30 60



VICINITY MAP

SCALE IN MILES
0 10 20 30 40



PLAN

SCALE IN FEET
0 200 400

MILE 181.7
H.W. 458.1 (1937)
U.P. 421.2
L.P. 412.0
LIFT 9.2'

BUILT 1904-1905
PUT IN OPERATION JAN. 1, 1906
DEPTH ON UPPER MITER SILL 8.04'
DEPTH ON LOWER MITER SILL 8.83'
U.S. PROPERTY 28.41 ACRES FEE
DEACTIVATED 31 AUG. 1951

GREEN RIVER

LOCK & DAM NO. 6

LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1980

FIGURE 5.

Barren River

Lock and Dam 1 **(Figure 6)**. The lock side of this facility is situated near the community of Green Castle at mile 15.0. The original lock and darn was constructed in 1841 and used until 1934 at which time a replacement lock was placed into service. The original lock chamber is still intact though it has been sealed as is no longer operable. This facility was closed to navigation following the breach in the dam at Woodbury in May 1965. The entirety of the floodplain formation occupied by the Government reservation appears to have been uniformly covered with a layer of fill dirt variably 6-8 ft deep resulting from the extensive construction associated with building the new lock chamber.

There is only one standing structures on this parcel. This is the 1930s era operations buildings a two-story steel reinforced, poured concrete structure adjacent to the lock. This building measures ca. 15 x 20 ft and has been extensively vandalized. AU other structures on this tract have been removed and shovel testing in these areas revealed only mottled earth and sporadic glass fragments and rusty wire nails. No in situ cultural materials were observed along the accessible portions of the exposed riverbank.

The Government owns no property on the abutment side of this facility. It is noted, however, that a substantial wall built of hewn stone stands directly across from the lock. These remains are likely associated with an early mill or other industrial structure. No field inspection was undertaken on this private property.

VII. CONCLUSIONS AND RECOMMENDATIONS

An inspection of the subject facilities revealed no evidence of either prehistoric or undisturbed historic era cultural remains. No further archaeological studies are recommended for these parcels of surplus government property. However, should cultural remains be encountered during the course of subsequent environmental remediation and other mandated activities, work in that area should cease and the Louisville District and Kentucky Heritage Council promptly notified.

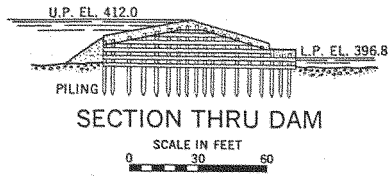
ACKNOWLEDGMENT

This report was prepared by Mr. Donald B. Ball (Archaeologist, SOPA) of the Louisville District of the U. S. Army Corps of Engineers. The fieldwork described herein was conducted by the author.

REFERENCES CITED

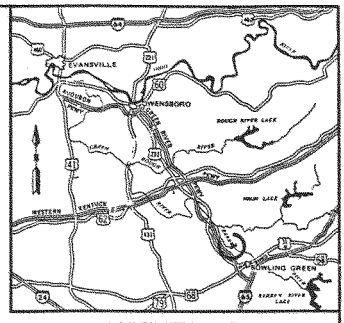
Kentucky Heritage Council
1991 Specifications for Archaeological Fieldwork and Assessment Reports. Frankfort.

BARREN RIVER R/H 9-2



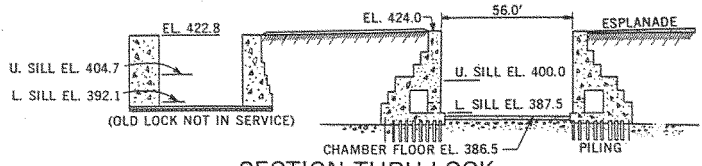
SECTION THRU DAM

SCALE IN FEET
0 30 60



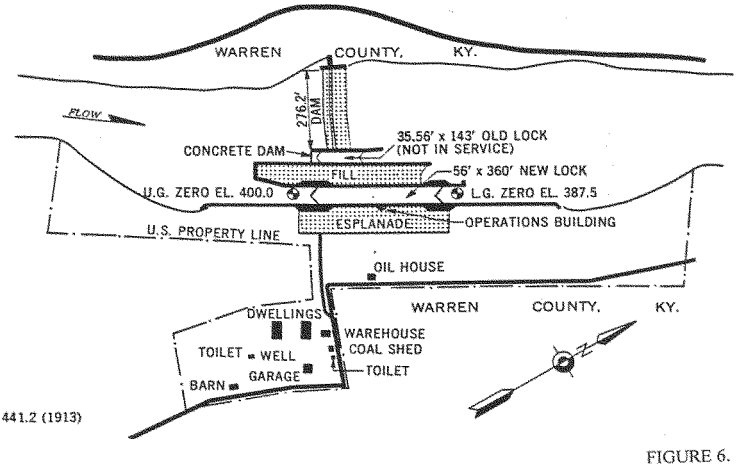
VICINITY MAP

SCALE IN MILES
0 10 20 30 40



SECTION THRU LOCK

SCALE IN FEET
0 30 60



MILE 15
MAX. H.W. 441.2 (1913)
U.P. 412.0
L.P. 396.8
LIFT 15.2

PLAN

SCALE IN FEET
0 200 400

OLD LOCK AND DAM BUILT 1841
ACQUIRED BY U.S. GOV'T. FEB. 20, 1886
NEW LOCK BUILT 1933-1934
PUT IN OPERATION SEPT. 17, 1934
DEPTH ON UPPER MITER SILL 12.0'
DEPTH ON LOWER MITER SILL 9.3'
U.S. PROPERTY 20.1 ACRES (FEE)
8.0 ACRES (FLOWAGE EASEMENT)

NOTE: LOCK CLOSED TO NAVIGATION DUE TO LOSS OF POOL AT GREEN RIVER DAM NO. 4.

FIGURE 6.

BARREN RIVER

LOCK & DAM NO. 1

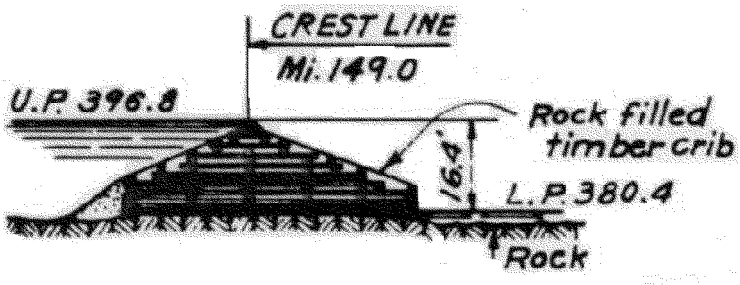
LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1978

Harralson, Agnes S.
1981 Steamboats on the Green and the Colorful Men Who Operated Them Kentucke Imprints, Berea, Kentucky.

McGrain, Preston and James C. Curren
1978 Topography of Kentucky. Special Publication 25, Kentucky Geological Survey, University of Kentucky, Lexington.

Secretary of the Interior
1983 Standards and Guidelines for Archeology and Historic Preservation. Federal Register Vol. 48, No. 190

SUMMARY OF HISTORY AND ARCHITECTURE OF GREEN RIVER LOCKS 3-6 AND BARREN RIVER LOCK 1, KENTUCKY



PROFILE OF TIMBER CRIB DAM AT GREEN RIVER LOCK NO. 4

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JULY 2000

#2 Attachment (3)

NTIS FORM

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4. TITLE AND SUBTITLE –Summary of History and Architecture of Green Rover Locks 3-6 and Barren River Lock 1, Kentucky			5. FUNDING NUMBERS N/A
6. AUTHOR(S) – Donald B. Ball			
7. PERFORMING ORGANIZATION NAME AND ADDRESS – U.S. Army Corps of Engineers, Louisville District, ATTN: PM-P-E, P.O. Box 59, Louisville, KY 40201-0059			8. PERFORMING ORGANIZATION REPORT NUMBER - None -
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13. ABSTRACT (Maximum 200 words) – This study presents a synoptic history of the upper Green River navigation system and discussion of the remaining structures at these now derelict Government facilities in central Kentucky consisting of Lock and Dams Nos. 3-6 on the Green River and Lock and Dam No. 1 on the Barren River, a tributary. Only five standing structures currently remain and all are extensively deteriorated. Despite the deteriorated condition of these facilities, it is contended that they are eligible for listing in the National Register of Historic Places. Specific recommendations concerning future recordation efforts appear in this study.			
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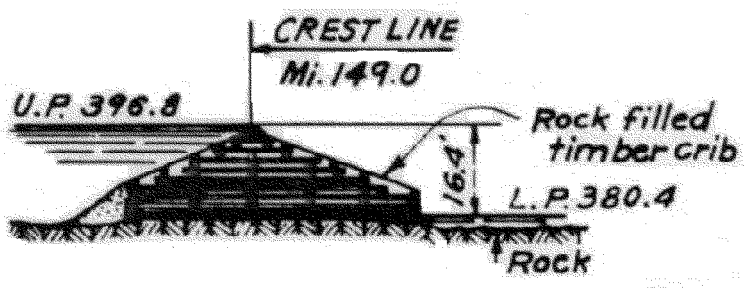
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT - Unclassified	20. LIMITATION OF ABSTRACT

Please fill in the title and subtitle (4), author(s) (6), performing organization name and address (7), sponsoring/monitoring agency (9), abstract (13), and subject terms (14; key words, 4 to 6). Please submit on a floppy disk with your report.

4/92

SUMMARY OF HISTORY AND ARCHITECTURE OF GREEN RIVER LOCKS 3-6 AND BARREN RIVER LOCK 1, KENTUCKY



PROFILE OF TIMBER CRIB DAM AT GREEN RIVER LOCK NO. 4

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JULY 2000

SUMMARY OF HISTORY AND ARCHITECTURE OF GREEN RIVER LOCKS 3-6 AND BARREN RIVER LOCK 1, KENTUCKY

ABSTRACT

This study presents a synoptic history of the upper Green River navigation system and discussion of the remaining structures at these now derelict Government facilities in central Kentucky consisting of Lock and Dams No. 3-6 on the Green River and Lock and Dam No. 1 on the Barren River, a tributary. Only five standing structures currently remain and all are extensively deteriorated. Despite the deteriorated condition of these facilities, it is contended that they are eligible for listing in the National Register of Historic Places. Specific recommendations concerning future recordation efforts appear in this study.

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***ERRATA:**
The caption to Figure 30 (page 34) should read: "Downstream gate of Green River Lock and Dam No. 4." This figure should have appeared in Appendix B. We apologize for any inconvenience.

SUMMARY OF HISTORY AND ARCHITECTURE OF GREEN RIVER LOCKS 3-6 AND BARREN RIVER LOCK 1, KENTUCKY

I. INTRODUCTION

This study was undertaken in response to a request from the Kentucky State Historic Preservation Officer (SHPO) for information on the history and remaining structures at Green River Locks and Dams Nos. 3-6 and Barren River Lock and Dam No. 1 for the purpose of determining their eligibility for inclusion in the National Register of Historic Places prior to disposal of these properties by the U. S. Government. A total of eight locks and dams (**Table 1; Figure 1**) were at one time associated with the entirety of the Green River navigation system. At present, only Locks and Dams Nos. 1 and 2 are still operated.

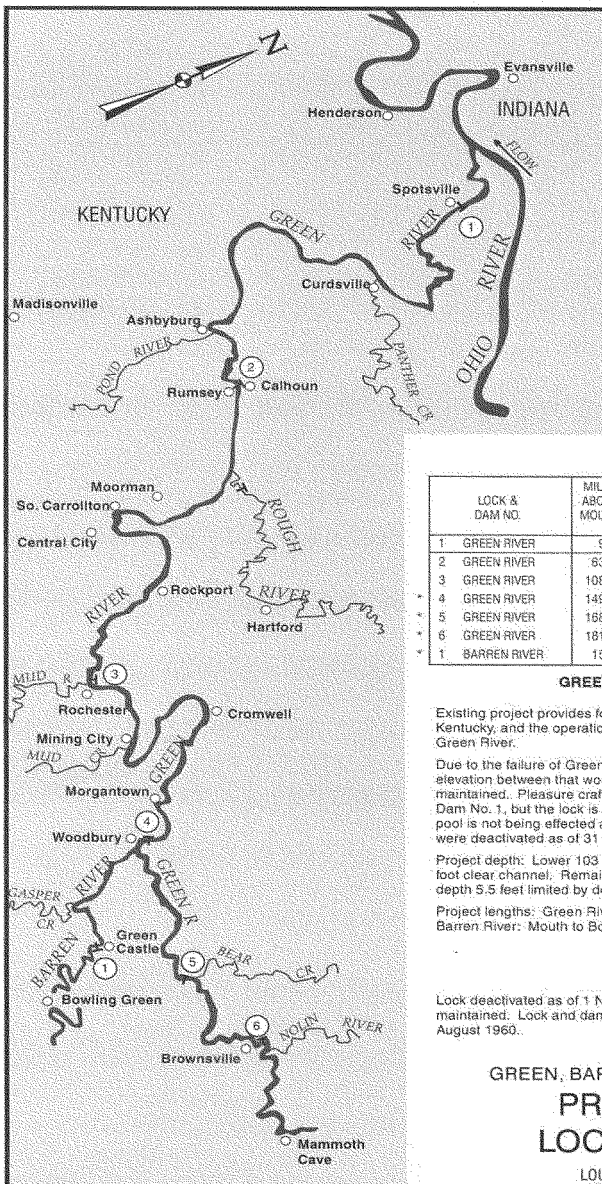
These facilities have previously been examined for archaeological resources (Ball 1998). No prehistoric or early (pre-1950) historic sites were discovered and no further investigations of this nature are required.

TABLE 1. COMPONENTS OF GREEN RIVER NAVIGATION SYSTEM.

Lock and Dam	River Mile	Existing Lock Constructed	Existing Dam Constructed	Dam Type
Green River				
No. 1	9.1	1954-1956	1835-1840	Concrete capped timber crib
No. 2	63.1	1954-1956	1954-1956	Concrete
No. 3	108.5	1833-1836	1836	Timber crib
No. 4	149.0	1834-1839	1839	Timber crib
No. 5	168.1	1933-1934	1933-1934	Concrete
No. 6	181.7	1904-1905	1904-1905	Concrete capped wood pilings
Barren River				
No. 1	15.0	1933-1934	1841	Concrete capped timber crib
Rough River				
No. 1	7.0	1896	1896	Timber crib

Notes:
1. Green River Locks and Dams Nos. 1 and 2 still in operation.
2. Green River Lock and Dam No. 3 deactivated September 1981.
3. Green River Lock and Dam No. 4 closed 1965.
4. Green River Locks and Dams Nos. 5 and 6 deactivated August 31, 1951.
5. Barren River Lock and Dam No. 1 closed 1965 due to failure of Green River Lock and Dam No. 4. The original 1840's lock chamber remains extant though long rendered inoperable.
6. Rough River Lock and Dam No. 1 deactivated November 1, 1950; property deeded to City of Hartford, Kentucky, on August 3, 1960. Lock and dam have been demolished.

GREEN, BARREN & ROUGH RIVERS R/H 2



LEGEND

⊢ (53) Lock & Dam Number

STATUS

⊢ Completed

SCALE IN MILES

5 0 5

	LOCK & DAM NO.	MILES ABOVE MOUTH	LOCK WIDTH	LOCK LENGTH	TYPE OF DAM	POOL ELEVATION UPPER	POOL ELEVATION LOWER
	1 GREEN RIVER	9.1	84	600	FIXED	349.1	337.3
	2 GREEN RIVER	63.1	84	600	FIXED	363.4	349.1
	3 GREEN RIVER	108.5	35.8	137.5	FIXED	380.4	363.4
*	4 GREEN RIVER	149.0	35.8	138.0	FIXED	396.8	380.4
*	5 GREEN RIVER	168.1	56	360	FIXED	412.0	396.8
*	6 GREEN RIVER	181.7	36	145	FIXED	421.2	412.0
*	1 BARREN RIVER	15.0	56	360	FIXED	412.0	396.8

GREEN AND BARREN RIVERS

Existing project provides for slack water navigation to Bowling Green, Kentucky, and the operation and maintenance of two locks and dams on Green River.

Due to the failure of Green River Dam No. 4 in May 1965, normal pool elevation between that works and Barren River Dam No. 1 cannot be maintained. Pleasure craft may operate in the pool above Barren River Dam No. 1, but the lock is closed to navigation and maintenance of the pool is not being effected at this time. Locks No. 5 and 6 on Green River were deactivated as of 31 August 1951.

Project depth: Lower 103 miles Green River improved (1955) for nine foot clear channel. Remainder of Green River and Barren River project depth 5.5 feet limited by depth of water on existing miter sills.

Project lengths: Green River: Mouth to mouth of Barren River 150 miles. Barren River: Mouth to Bowling Green, Kentucky, 30.1 miles.

ROUGH RIVER

Lock deactivated as of 1 November 1950 and project depth is no longer maintained. Lock and dam deeded to City of Hartford, Kentucky on 3 August 1960.

GREEN, BARREN & ROUGH RIVERS, KY.

PROJECT MAP
LOCKS AND DAM

LOUISVILLE, KY. DISTRICT
SCALE AS SHOWN
REVISED 30 SEPTEMBER 1995

II. GREEN RIVER NAVIGATION

Steam navigation on the Green River of central Kentucky began with the ascent of the river by the steamboat *McLean* and its arrival in Bowling Green in 1828[1]. In that same year, Kentucky established a Board of Internal Improvements which, in cooperation with the U. S. Army Corps of Engineers, initiated a series of topographic surveys oriented toward studying the feasibility of constructing a series of locks and dams along the Green and Barren rivers. In 1833, the state legislature authorized the recommended navigational improvements and construction work on Green River Locks and Dams Nos. 1 and 2 began shortly thereafter.

By 1835, the sites of Locks and Dams Nos. 1 and 2 on the Green River were under construction and the sites of Locks and Dams Nos. 3 and 4 on the Green River and Lock and Dam No. 1 on the Barren River had been selected. Despite construction setbacks caused by flooding during this period, by the early 1840s these efforts and the expenditure of $780,000 had resulted in the creation of a slack water navigational system affording a minimum depth of 6.0 feet (1.8 m) extending in excess of 175 miles (281.6 km) from the Ohio River upstream to Bowling Green, Kentucky (Johnson 1975:142). Notably, all of the dams associated with these locks were constructed of rock filled timber cribs with masonry abutments (ibid.).

During the Civil War, the Green and Barren river facilities were damaged and fell into disrepair. In 1868, the Kentucky legislature leased the navigation system to the newly formed Green and Barren River Navigation Company which undertook to repair the locks and dams (most notably Lock and Dam No. 3) and began charging tolls to those navigating on these rivers. Since company owned vessels paid no tolls, a *de facto* monopoly soon drove competing commercial shipping from these waters prompting a subsequent Federal investigation into company restraints on interstate commerce. Studies undertaken by the U.S. Army Corps of Engineers in 1879 reported to Congress that the tolls charged by the navigation company were excessive and by 1886 Congress approved a plan for the U. S. Government to purchase the navigational rights to the waterway for the sum of $135,000 in 1888. Soon thereafter, the dam at Lock No. 3, which had collapsed in 1887, was rebuilt and extensive snag removal was initiated. The system reopened in 1890 (Johnson 1975:143-144). From the mouth of the Green River to Lock and Dam No. 3, the Corps of Engineers maintained a 9½ ft (2.9 m) deep navigation channel; above Lock and Dam No. 3, this channel was reduced to but 5½ ft (1.7 m) (Anonymous 1965).

III. UPPER GREEN RIVER NAVIGATION FACILITIES

With the exception of some buildings at Lock and Dam No. 3, virtually all standing structures have been demolished at the upper Green River facilities (including Lock and

[1] The history of navigation on the Green River is discussed and documented in much greater detail in Crocker (1976); Greene (1898); Harralson (1981); and McClellan (1976). Navigation on the Green River has also been treated in a fictional account by Giles (1964).

Dam No. 1 on the Barren River). These facilities may be briefly described as follows.

Green River Lock and Dam No. 3 (see also Attachment A)

This facility is situated at river mile 108.5 in Ohio County, Kentucky (**Figures 2 and 3**). Originally constructed in the period 1833-1836, this property was acquired by the U. S. Government on February 4, 1895. Apart from the lock and dam, only three structures remain at this facility: (1) a single story brick house; (2) a sheet metal covered timber frame garage and work shed; and (3) a sheet metal covered timber frame office. All have been extensively vandalized and subjected to numerous flood episodes. The date of construction of the house is unknown but it may well have been standing at the time the facility was acquired by the Government. The two sheet metal covered buildings likely date to the mid-1930's.

The existing masonry lock was built in the period 1833-1836. The associated timber crib dam likely dates to the same time. Spanning 353 feet (107.6 meters) across the Green River, this timber crib dam is greatly deteriorated and was repaired prior to the facility's deactivation in September 1981 by dumping many tons of large limestone chucks along both faces. The dam is seldom visible except at times of extremely low water conditions.

Green River Lock and Dam No. 4 (see also Attachment B)

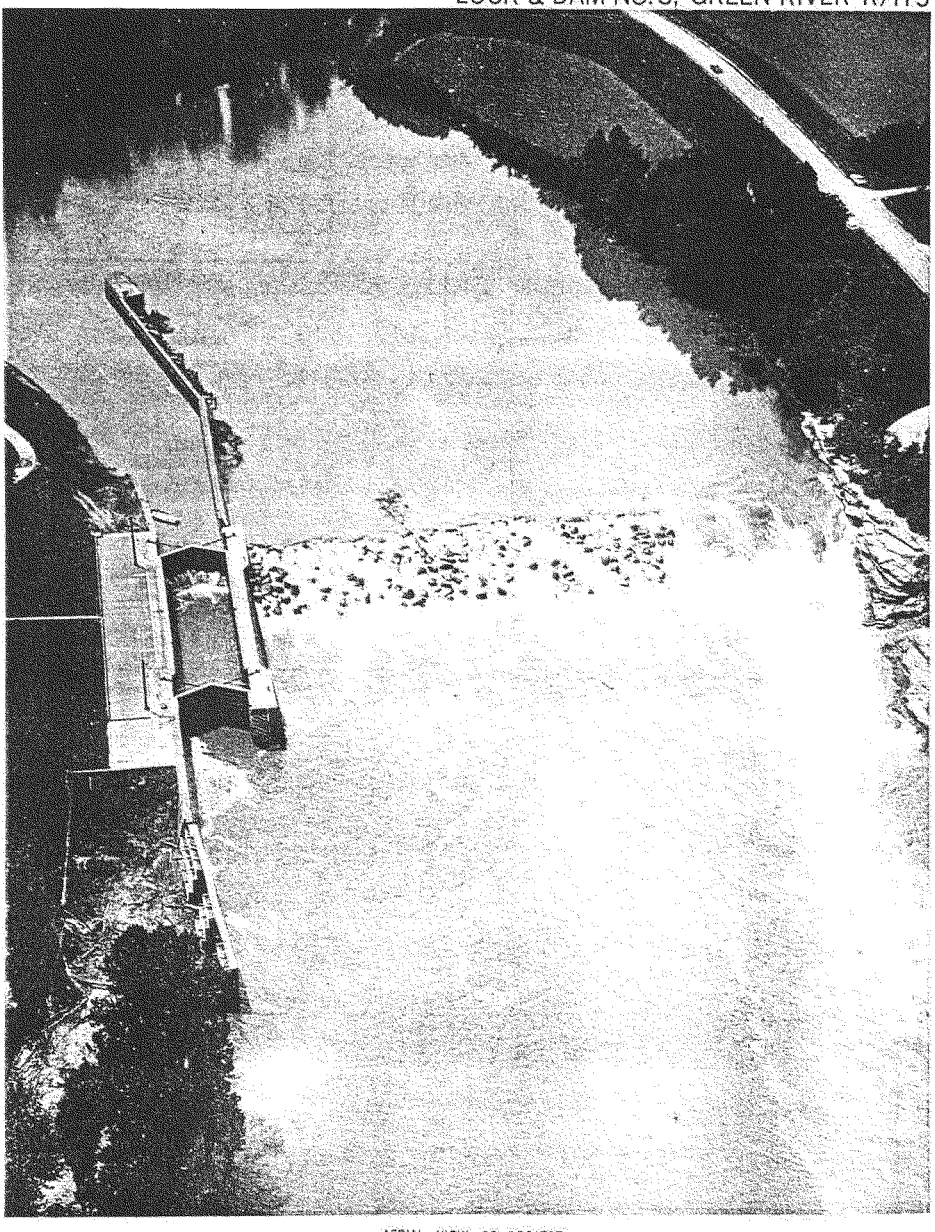
This facility is situated in the City of Woodbury at river mile 149.0 in Butler County, Kentucky (**Figures 4 and 5**). This facility was acquired by the U. S. Government on February 20, 1886. Although a number of structures associated with this facility are still standing (e.g., two houses, a pumphouse, a warehouse, and other support structures), all have been deeded to the City of Woodbury and none are presently owned by the Government. At this time, the U. S. Government owns only the lock and dam.

The lock at this property was constructed in the period 1834-1839. The now breached timber crib dam dates to the same period. The dam will be discussed below in greater detail.

Green River Lock and Dam No. 5 (see also Attachment C)

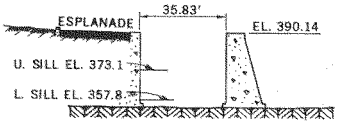
This facility is situated at river mile 168.1 in Butler County, Kentucky (**Figures 6 and 7**). The existing facility was constructed in the period 1933-1934 and replaced an older (and long demolished) lock about 0.2 mile downstream constructed ca. 1898-1899 and put in operation January 17, 1900. The only remaining remnant (the landward lock wall) of the earlier lock is located on U. S. Government property. All structures on this property have been demolished with the exception of a poured concrete control tower contemporary with the 1933-1934 lock. The exiting 1933-1934 lock (featuring a chamber of 56 x 360 feet) and dam (spanning 301 feet) are both of poured concrete construction. This facility was deactivated on August 31, 1951.

LOCK & DAM NO. 3, GREEN RIVER R/H 5



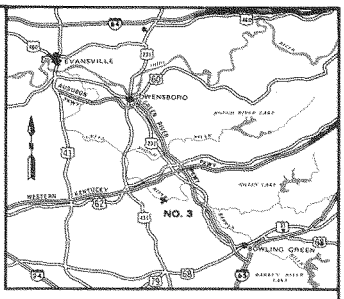
AERIAL VIEW OF PROJECT

GREEN RIVER R/H 5-2



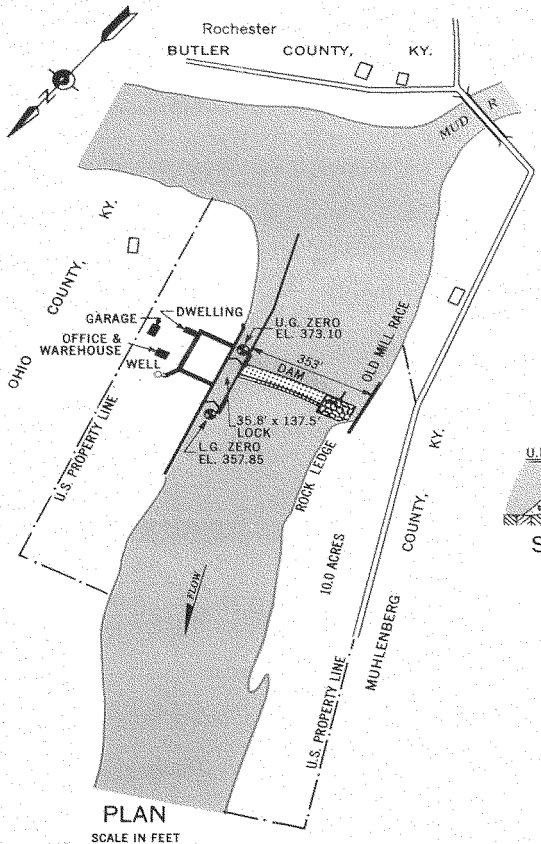
SECTION THRU LOCK

SCALE IN FEE.
0 30 60



VICINITY MAP

SCALE IN MILES
0 10 20 30 40

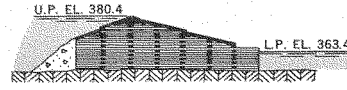


PLAN

SCALE IN FEET
0 200 400

MILE 108.5
H.W. 414.2 (1937)
U.P. 380.4
L.P. 363.4
LIFT 17.0'

BUILT 1833-1836
ACQUIRED BY U.S. GOV'T. FEB 4, 1895
DEPTH ON UPPER MITER SILL 7.3'
DEPTH ON LOWER MITER SILL 5.6'
U.S. PROPERTY 11.71 ACRES FEE,
5.01 ACRES PERMIT FOR FLOWAGE EASEMENT
LOCKING OPERATIONS WERE DISCONTINUED
IN SEPTEMBER 1981.



SECTION THRU DAM

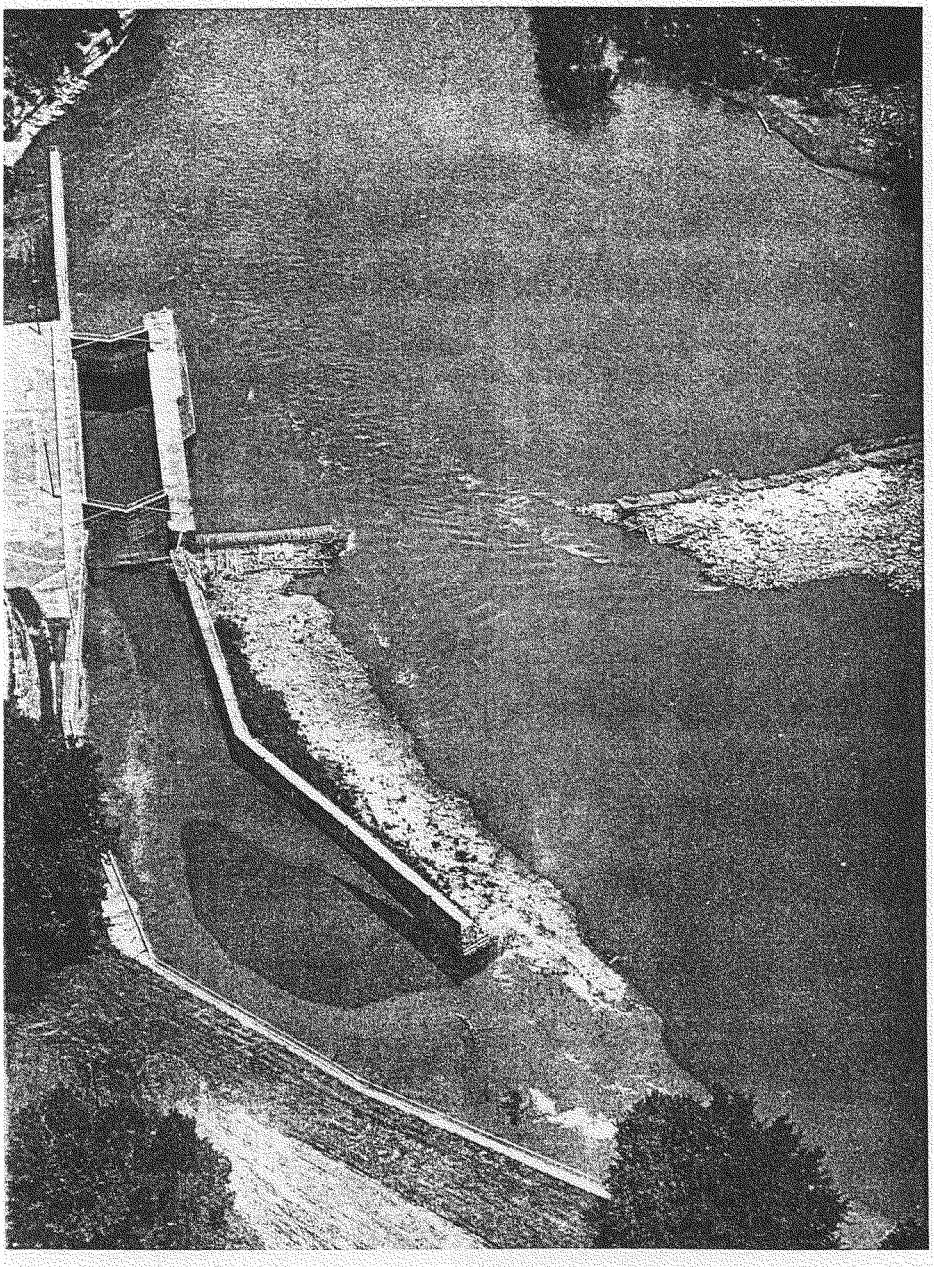
SCALE IN FEET
0 30 60

GREEN RIVER

LOCK & DAM NO. 3

LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1995

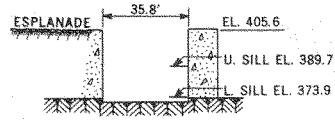
LOCK & DAM NO. 4 , GREEN RIVER R/H 6



2636

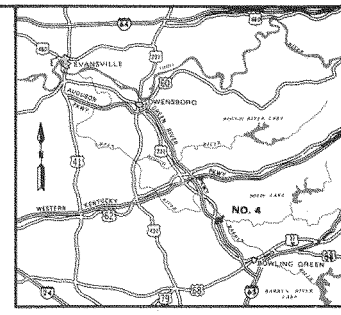
AERIAL VIEW OF PROJECT

GREEN RIVER R/H 6-2



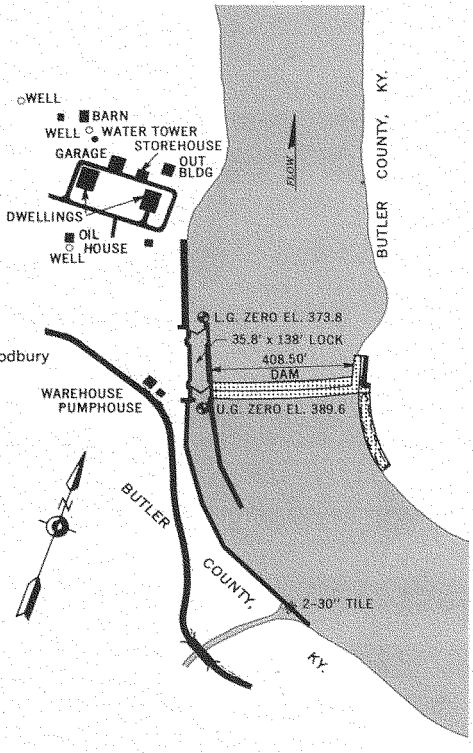
SECTION THRU LOCK

SCALE IN FEET
0 30 60



VICINITY MAP

SCALE IN MILES
0 10 20 30 40



PLAN

SCALE IN FEET
0 200 400



SECTION THRU DAM

SCALE IN FEET
0 30 60

MILE 149.0
H.W. 432.7 (1937)
U.P. 396.8
L.P. 380.4
LIFT 16.4'

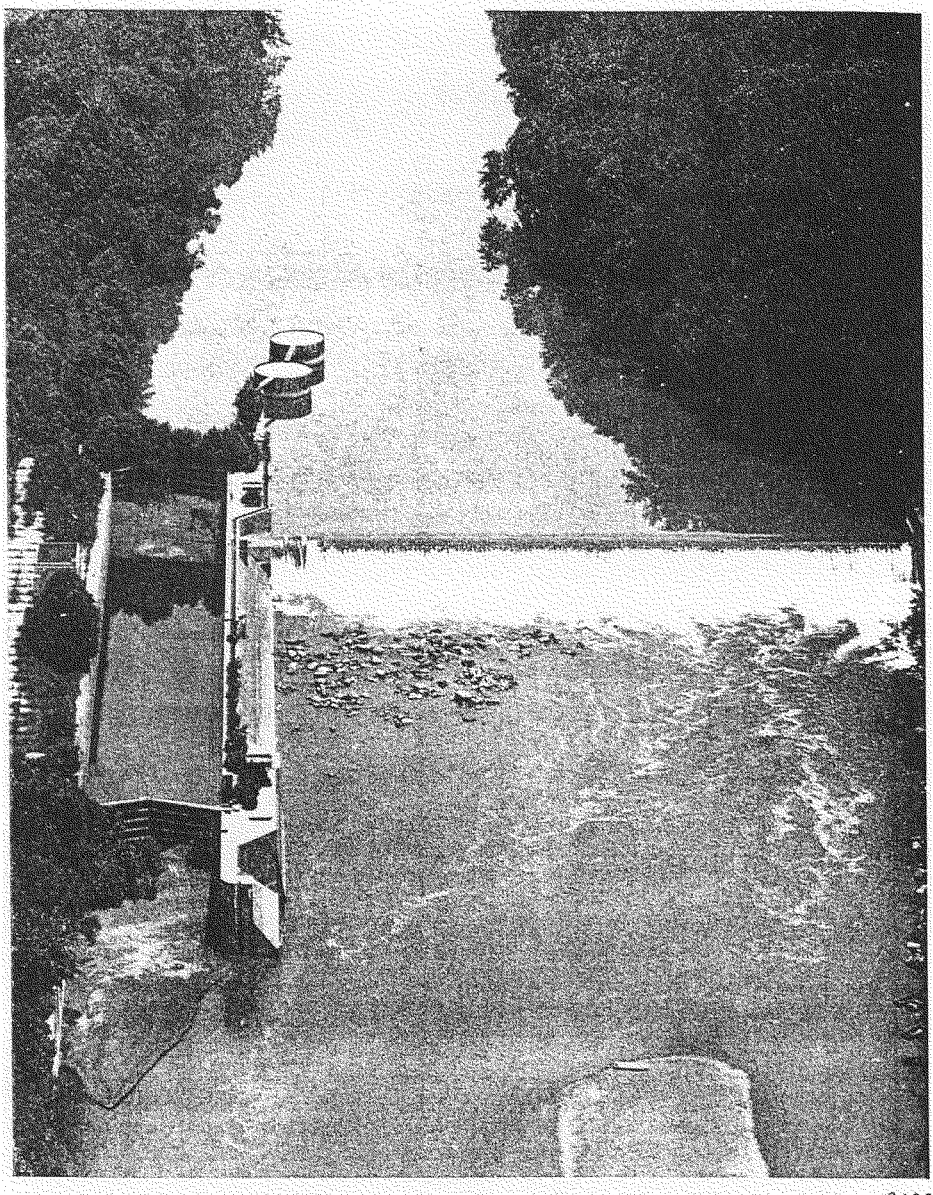
BUILT 1834-1839
ACQUIRED BY U.S. GOV'T FEB 20, 1886
DEPTH ON UPPER MITER SILL 7.1'
DEPTH ON LOWER MITER SILL 6.5'
U.S. PROPERTY 0.01 ACRES (FEE)
6.27 ACRES (FLOWAGE EASEMENT)
6.62 ACRES (EASEMENT OTHER)
DAM WAS BREACHED 24 MAY 1965
LOCK CLOSED TO TRAFFIC
POOL NOT MAINTAINED
PROPERTY HAS BEEN DEEDED TO CITY
OF WOODBURY WITH ALL BUILDINGS.
(LOCK AND LOCKWALLS REMAIN U.S. PROPERTY)

GREEN RIVER

LOCK & DAM NO. 4

LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1995

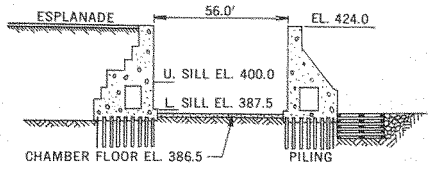
LOCK & DAM NO. 5, GREEN RIVER R/H 7



AERIAL VIEW OF PROJECT

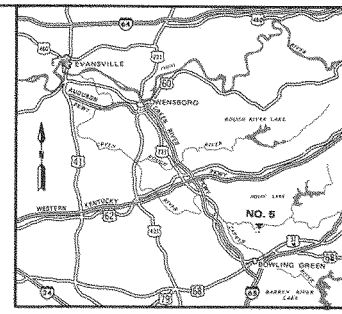
2635

GREEN RIVER R/H 7-2



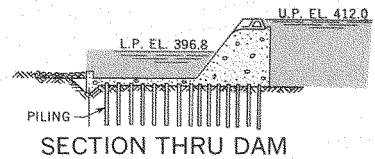
SECTION THRU LOCK

SCALE IN FEET
0 30 60



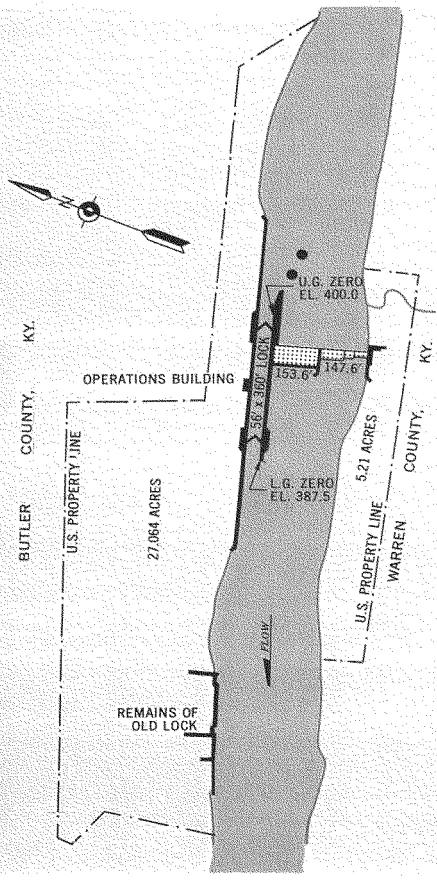
VICINITY MAP

SCALE IN MILES
0 10 20 30 40



SECTION THRU DAM

SCALE IN FEET
0 30 60



PLAN

SCALE IN FEET
0 200 400

MILE 168.1
H.W. 447.7 (1937)
U.P. 412.0
L.P. 396.8
LIFT 15.2'

OLD LOCK PUT IN OPERATION JAN. 17, 1900
NEW LOCK AND DAM BUILT 1933-1934
OLD LOCK AND DAM REMOVED 1934
NEW LOCK PUT IN OPERATION DEC. 22, 1934
DEPTH ON UPPER MITER SILL 12.0'
DEPTH ON LOWER MITER SILL 9.3'
U.S. PROPERTY 32.27 ACRES (FEE)
12.94 ACRES (FLOWAGE EASEMENT)
DEACTIVATED 31 AUG. 1951

NOTE:
32.27 ACRES INCLUDES 1.898 ACRES
IN ROAD AREA NOT SHOWN ON THIS MAP.

GREEN RIVER

LOCK & DAM NO. 5

LOUISVILLE, KY. DISTRICT

SCALES AS SHOWN

REVISED 30 SEPTEMBER 1980

Green River Lock and Dam No. 6 (see also Attachment D)

Situated at river mile 181.7 in Edmonson County, Kentucky (**Figures 8 and 9**), this facility was constructed in the period 1904-1905. All structures on this property have been demolished. The lock (featuring a chamber of 36 x 145 feet) and dam (spanning 220 feet) are both of poured concrete construction. This facility was deactivated on August 31, 1951.

Barren River Lock and Dam No. 1 (see also Attachment E)

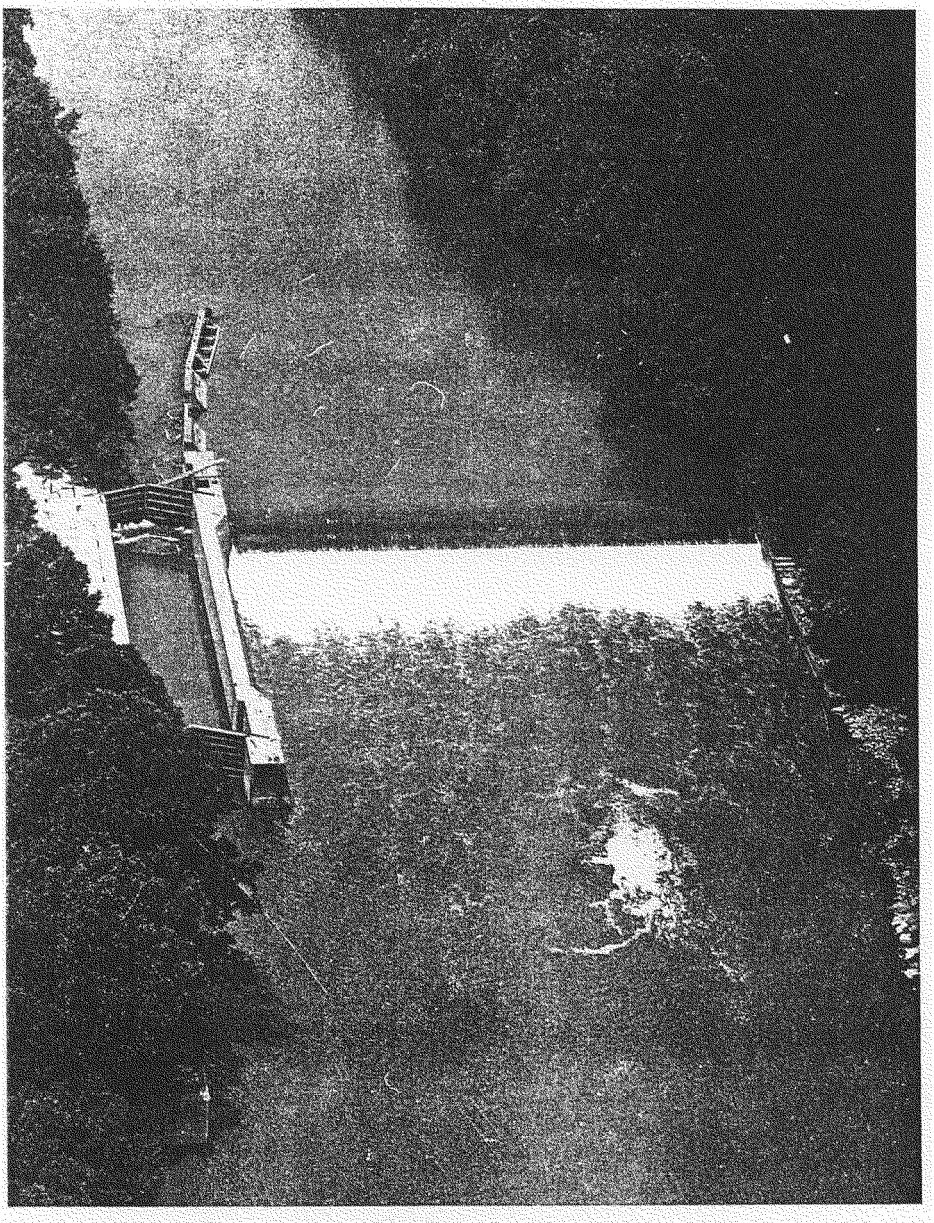
Situated at river mile 15.0 on the Barren River in Warren County, Kentucky (**Figures 10 and 11**), this facility was constructed in 1841. With the exception of a poured concrete control tower standing immediately adjacent to the lock chamber, all structures at this facility have been demolished. The lock (featuring a chamber of 56 x 360 feet) is of poured concrete construction and was built in the period 1933-1934. It was placed into service on September 17, 1934. At the time the new lock was constructed, the original 1841 masonry lock (with a chamber of 35.56 x 143 feet) was sealed at the upstream end and is yet intact. The dam (spanning just over 276 feet) is of timber crib construction though it was capped with concrete at the time the new lock was built. The dam abuts on the opposing bank to a point near the substantial masonry remnants of a 19th mill. These ruins are situated on private property and are not owned by the U. S. Government. This lock was closed in May of 1965 as a consequence of the failure of the dam at Green River Lock No. 3.

IV. TIMBER CRIB DAMS

The practice of constructing dams as a means of harnessing stream flow certainly dates to antiquity in many regions of the world. Though such structures are typically associated with the impoundment of water for the operation of grist and other types of mills (e.g., lumber and textile), they are also constructed for other purposes such as navigation, flood control, irrigation, and the creation of reservoirs. But a sampling of the diverse literature on mills and various impoundment devices includes the following sources: Cobb (1978); Council (1983; 1984); Coy et al. (1991): Espenshade and Gardner (1989); Garber (1970); Jackson (1990); Jeane (1981): Leffel (1881); Macauley (1983); McBride et al. (1988); McCoy (1980); Miller (1992); Newman (1984); Pusey (1931); Reed et al. (1994); Smith and Castille (1986); Starbuck (1990a; 1990b); Suggs (1990); Wegmann (1927); Zimiles and Zimiles (1973).

The methods and materials employed in the building of dams have varied widely dependent upon the availability of both labor and materials suitable for the purpose at hand (see **Figures 12**). Of present interest are the timber crib dams associated with the navigational facilities constructed on the upper Green River.

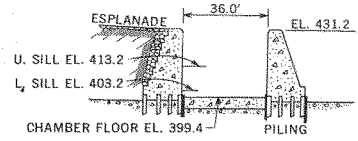
LOCK & DAM NO. 6, GREEN RIVER R/H 8



AERIAL VIEW OF PROJECT

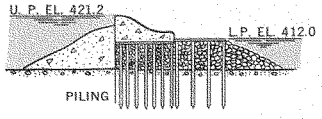
2634

GREEN RIVER R/H 8-2



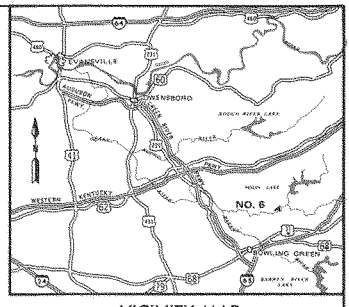
SECTION THRU LOCK

SCALE IN FEET
0 30 60



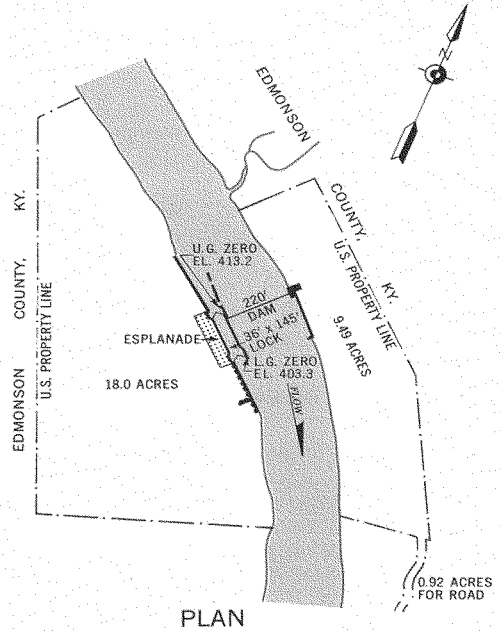
SECTION THRU DAM

SCALE IN FEET
0 30 60



VICINITY MAP

SCALE IN MILES
0 10 20 30 40



PLAN

SCALE IN FEET
0 200 400

MILE 181.7
H.W. 458.1 (1937)
U.P. 421.2
L.P. 412.0
LIFT 9.2'

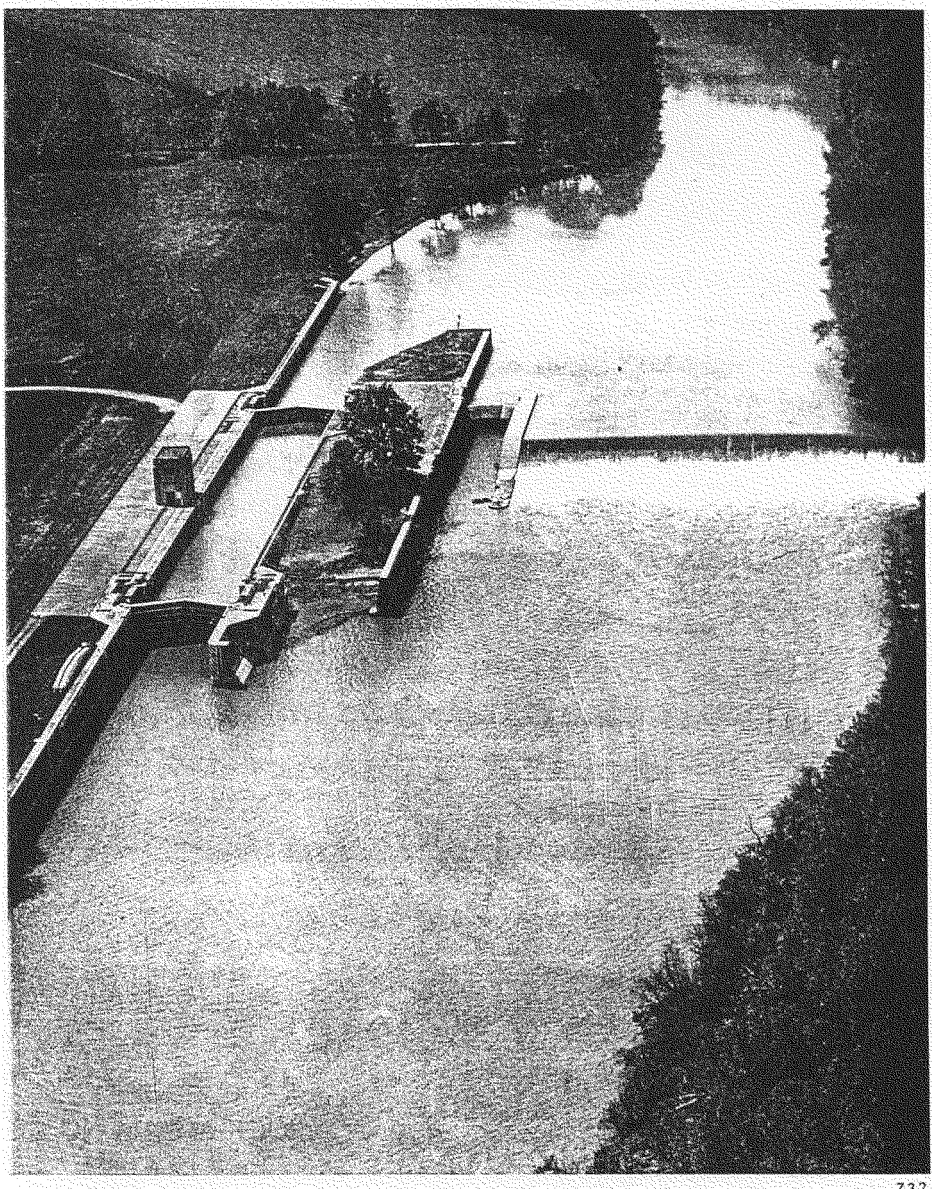
BUILT 1904-1905
PUT IN OPERATION JAN. 1, 1906
DEPTH ON UPPER MITER SILL 8.04'
DEPTH ON LOWER MITER SILL 8.83'
U.S. PROPERTY 28.41 ACRES FEE
DEACTIVATED 31 AUG. 1951

GREEN RIVER

LOCK & DAM NO. 6

LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1980

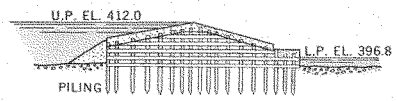
LOCK & DAM NO. 1, BARREN RIVER R/H 9



732

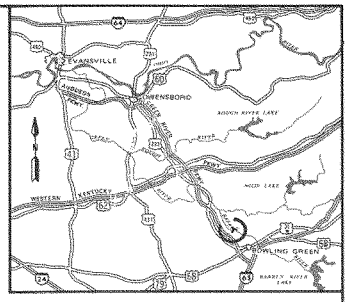
AERIAL VIEW OF PROJECT

BARREN RIVER R/H 9-2



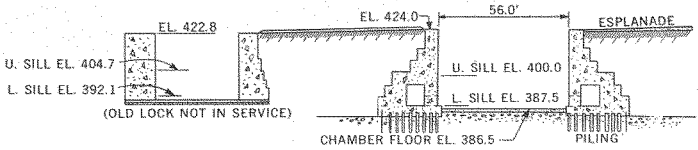
SECTION THRU DAM

SCALE IN FEET
0 30 60



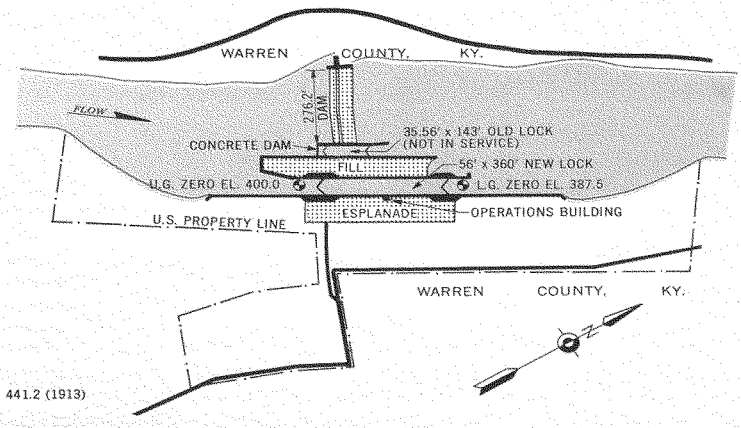
VICINITY MAP

SCALE IN MILES
0 10 20 30 40



SECTION THRU LOCK

SCALE IN FEET
0 30 60



MILE 15
MAX. H.W. 441.2 (1913)
U.P. 412.0
L.P. 396.8
LIFT 15.2

PLAN

SCALE IN FEET
0 200 400

OLD LOCK AND DAM BUILT 1841
ACQUIRED BY U.S. GOV'T. FEB. 20, 1886
NEW LOCK BUILT 1933-1934
PUT IN OPERATION SEPT. 17, 1934
DEPTH ON UPPER MITER SILL 12.0'
DEPTH ON LOWER MITER SILL 9.3'
U.S. PROPERTY 20.1 ACRES (FEE)
8.0 ACRES (FLOWAGE EASEMENT)

NOTE: LOCK CLOSED TO NAVIGATION DUE TO LOSS OF POOL AT GREEN RIVER DAM NO. 4.

BARREN RIVER

LOCK & DAM NO. 1

LOUISVILLE, KY. DISTRICT
SCALES AS SHOWN
REVISED 30 SEPTEMBER 1978

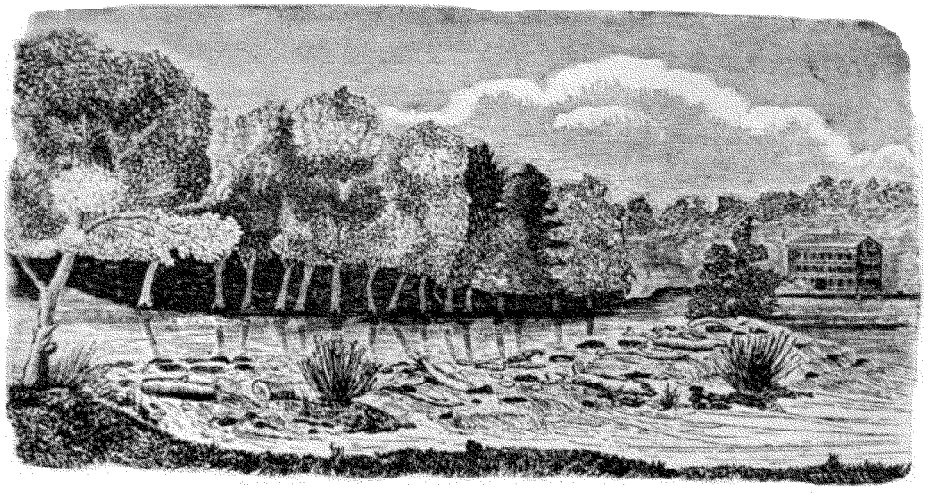


FIGURE 12. BRUSH, STONE, AND GRAVEL DAM (reproduced from Leffel 1881:45).

Along the Green River system, the dams associated with the various locks are representative of several diverse construction methods (cf. Table 1). Among those built of timber, the dams at Green River Lock No. 1 and Barren River Lock No. 1 were capped with concrete. The dam at Rough River Lock No. 1 has been demolished. Though the dam at Green River Lock No. 3 is yet intact, it was repaired by the placement of many tons of large blocks of limestone (some the size of small automobiles) and is rarely visible except during periods of exceptionally low water conditions. Accordingly, the remnants at Lock No. 4 in the community of Woodbury in Butler County, Kentucky, are the only such remains both readily accessible for examination and affording the opportunity to view its method of construction.

Timber crib dams were constructed in several divergent forms. Likely one of the more commonplace varieties was the ramp type (Figure 13). The construction of ramp type timber crib dams is discussed in greater detail in Leffel (1881) and Macauley (1983:31-33). Another form, apparently used for purely temporary purposes, was configured like a straight walled log structure (Figures 14 and 15). One of the more interesting examples of this type (see Figure 8) was used in effect as a slash dam to facilitate moving a flotilla of Union gunboats during the Civil War (Smith and Castille 1986).

A third type – and applicable to several of the facilities discussed herein – was of more substantial construction and in profile resembled an inverted, broad based "V". This latter form was best suited for larger scale industrial and navigational applications. Notable examples of this type of timber crib dam include one spanning in excess of 500 ft (152

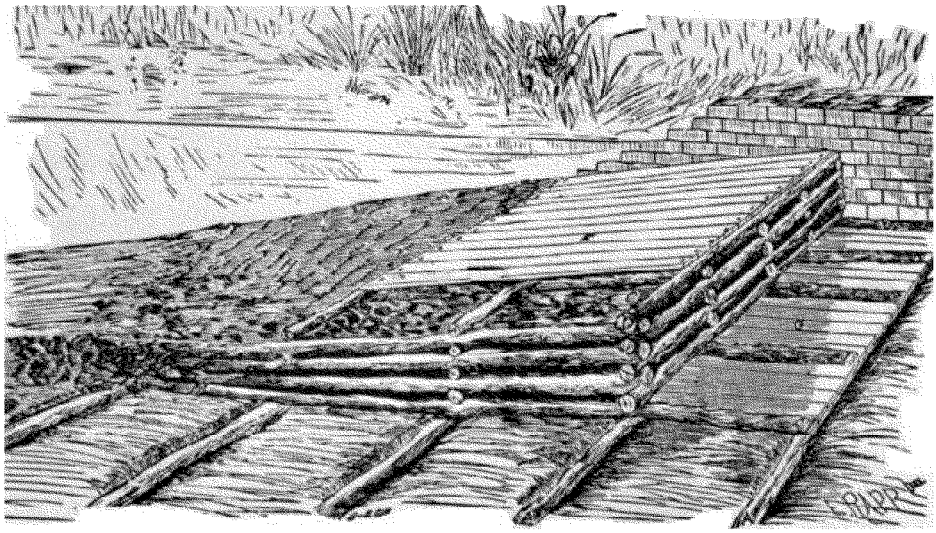


FIGURE 13. RAMP TYPE TIMBER CRIB DAM (reproduced from Leffel 1881:12).

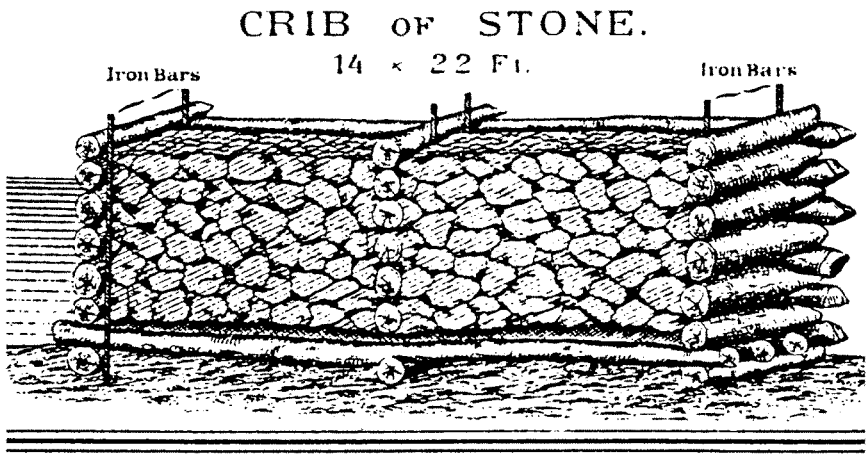


FIGURE 14. DRAWING OF CIVIL WAR ERA CRIB DAM SECTION SUBMITTED WITH COLONEL BAILEY'S REPORT (reproduced from U.S. War Department 1891-1895: Plate 53-3).

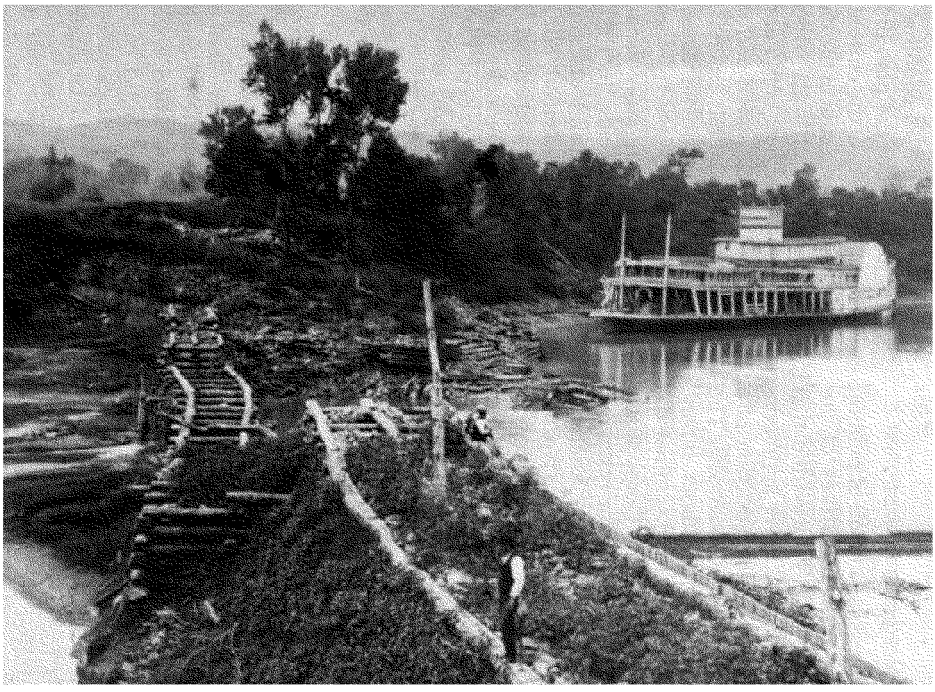


FIGURE 15. TIMBER CRIBS USED TO REPAIR BREACH IN LOCK AND DAM NO. 1 ON THE KENTUCKY RIVER IN 1883 (reproduced from Johnson 1975:150).

m) across the Salt river near Phoenix, Arizona, built in the 1890s (Jackson 1988:246-247), the Canyon Ferry Dam built across the Missouri River in Montana in 1898 which spanned 485 ft (148 m) and stood 29 ft (8.8 m) high (Wegmann 1927:293), and the Sewell's Fall Dam constructed between 1892-1894 across the Merrimack River in Concord, New Hampshire, which spanned 497 ft (151.5 m) and stood 22 ft (6.7 m) high (Starbuck 1990b). Indeed, a timber crib dam was utilized in 1889 to impound the water which powered one of the first hydroelectric plants in the nation constructed on the Wilamette River at Oregon City, Oregon (Condit 1969:165). Despite the relative importance of their applications, with rare exception such dams are effectively unknown in the regional archaeological and molinological literature. In the summer of 1998, the well preserved NE-SW oriented foundational remnants of a rock filled timber crib dam were observed in the community of East Laport in Jackson County, (western) North Carolina, at or near stream mile 45.85 on the Tuckasegee River. Spanning the river bed for a distance of ca. 70 feet (21.3 meters), this likely ramp type example is immediately adjacent to and readily visible from Highway 107 (cf. USGS 7.5' "Sylva East, N.C." quadrangle, 1946, photorevised 1990). A presently closed (and likely non- contemporary) single story frame commercial structure situated on the right (eastern) bank of the river

and elevated on its riverward side by an earth filled stone retaining wall suggests that the dam was originally associated with a milling operation.

For present purposes, it is fortunate that one of the rare early descriptions of these structures is an account of the construction of a timber crib dam associated with the Stedman mill complex along the reaches of Elkhorn Creek near Frankfort, Kentucky. Upon acquiring this facility in 1833, the Stedman brothers were confronted with replacing a dam destroyed by flooding three years before. To this end, the brothers hired Presly Neal, described as:

> ...a Kind of Rough Carpenter. So we imployed him as a Kind of boss in Building the dam. He said he had put up sevral Dams. He told us of the Best hands in The neighborhood that we could get at Fifty Cnts per day & Found. We made arrangement with Him to Be down the next Monday to commence Getting timbers For the dam.
>
> The Next Morning all hands went to the woods. We hired Two hands to Cut down trees & two to Saw them of & help load the waggon. ...The Streight oak timber Stood Thick then. We Soon had to imploy another waggon, as one Could Not keep up as fast as we Cut the logs. We worked the week out & Satturday after Sundown Started home...
>
> The nex week we Continued Cutting & Hauling logs. We increased the Number of Hands this week in digging out the Foundation For the dam. The old dam Being out so long, Thare was a Bank of Gravvel on this Side Six ft. Deep that had to Be Removed Before we Could Commence Building the dam. This & Removing the old dam was a task near half as much work as Building a new dam. The Third week we had Thirty men imployed. All the neighbors began to Believe we ware in Earnest. Piles of logs acumilated. The old dam was Removed. Evrything went along S[m]oothly & Fortune Seemed to Smile on our undertaking.
>
> The 4th week we Commenced putting in the Mill dam. We put in Round logs notched into the ties & as we Raised the dam it had to Be filled up with Stone. We hired two Carts from Frankfort, one From old Man Goin-Sanford, his son, as driver. He was Then quite young & a first Rate hand. The other Belong to old Harry Mordica the plasturer. We now Exceeding anxious to finish Before the cold weather Set in or a Rise in The Creek. It Frequent Rained near Evry week ondly Enough to Stop us from work a few hours At a time. By the middle of October we had the dam Seven Feet high & all Filled in & Secured so That it woold Be Safe till the next Summer (original spelling and grammar retained; Hockensmith 1998:85-86).

It is reported that the Stedman brothers had to rebuild the dam several times in the following years due to floods. In 1857, it is known that it cost $4,000 to completely replace the dam (ibid.:86).

V. DAM AT GREEN RIVER LOCK NO. 4

The timber crib dam at Lock and Dam No. 4 was constructed in 1839 adjacent to a masonry lock chamber as an integral component of this navigational facility. While it is known that repairs were undertaken along the entire Green River navigation system as it existed at the time of acquisition by the U. S. Government in the 1880's, it is not reported if the dam at Lock No. 4 was rebuilt or simply repaired as needed. In all likelihood, this component of the facility was simply repaired. Though a concrete abutment had been installed along the right bank terminus (likely in the 1930's), the dam had not been substantially altered since it was built and had long received minimal maintenance. Indeed, some of the last lock workers assigned to this facility reported that leaks were routinely sealed by the expedient method of packing bales of hay into the cracks in the dam. The failure (breach) of this 126 year old structure on May 24, 1965, in concert with declining river traffic on the upper Green River, resulted in the permanent closure of this portion of the waterway (including Barren River Lock No. 1) to commercial traffic (Anonymous 1965; Johnson 1975:243).

An examination of a scaled profile drawing of the dam prepared by the U. S. Army Corps of Engineers (**Figure 16**) and visual inspection of the remnants of this facility served to provide a number of insights into the configuration and construction of this type of once commonplace impoundment device. Spanning 408 ft (124.4 m), the dam rose to a height of 16.4 ft (5.0 m) above the bed of the river. As viewed along its upstream-downstream profile, the interlocking cribs forming the basal portion of the dam measured approximately 49 ft (14.9 m) and rose to a height of about 6.6 ft (2.0 m). Resting atop and centered upon this foundation was a generally pyramid shaped crown extending upward another 9.8 ft (3.0 m).

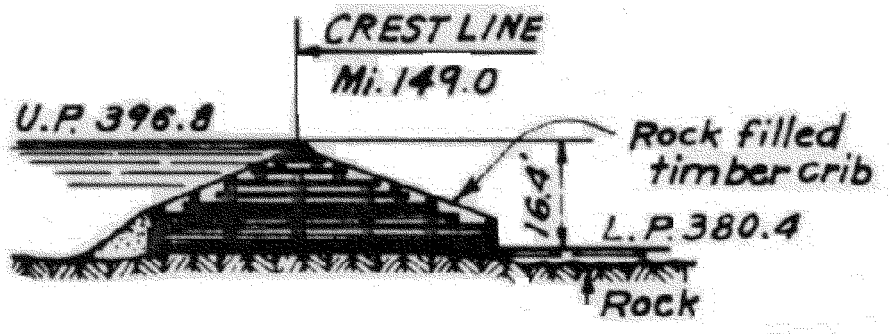


FIGURE 16. PROFILE OF GREEN RIVER DAM NO. 4.

In simple terms, the basic construction of the dam is best described as a series of small, interlocking log cabins. Accessible beams yet in a reasonable state of preservation were of two sizes. The smaller beams measured 8 x 8 in (20 x 20 cm) while the larger beams measured 9 x 15 in (23 x 38 cm). Though it was not possible to determine the length of these elements, the visible portion of one beam near the existing waterline was

at least 30 ft (9.1 m) in length. The type(s) of wood used for these beams is not known. Two individual pens were sufficiently accessible to measure. As facing across the river, the interior dimensions of the smaller pen measured 8.75 x 6.5 ft (2.67 x 1.98 m). The larger pen measured 8.5 x 8.33 ft (2.59 x 2.54 m).

The sloping sides of the dam (see **Figures 17-18; see also Figure 4)** were originally covered with a plank apron, a feature typical of such construction. Though the existing profile (**Figure 19**) of the dam is too deteriorated to show construction details, the rounded appearance of the remaining crib remnants generally conforms to the engineering profile's pyramidal configuration. In marked contrast to classic log structure construction methods, no evidence was observed of any form of corner notching. Rather, all beams appeared to have square cut ends and were held together with at least two sizes of large spikes (retaining pins). The smaller – and more commonplace – spikes measured 30 in (67.5 cm) in length and 0.75 in (3.4 cm) in diameter (**Figure 20**). The longer spikes measured 36 in (91 cm) in length and exhibited a square cross section measuring 0.75 in (1.9 cm) on the side.

The cross section of the resultant dam (**Figure 21**) created a structure occupying some 563.5 ft^2 (52.37 m^2). This figure times the span of the dam (408 ft/124.36 m) reveals that this structure contained approximately 229,900 ft^3 (6,500 m^3) of rock fill. An inspection of the portion of the dam adjacent to the lock indicates that two types of rock were used. The interior fill appeared to be now much weathered sandstone capped by a thinner veneer of limestone. This suggests that the interior fill was placed at the time of initial construction while the limestone may have been added at the time various repairs were undertaken in the 1880s.

Aside from damage caused by floods, as exemplified by the dam at Lock No. 4 age and decay were the greatest destructive forces leading to the failure of timber crib dams. Within the context of the Green River navigational system, this venerable structure remained in use for many years after it had already become an outdated relic of an earlier age. In addition to being threatened by the ongoing effects of deterioration, there is an increasing effort on the part of environmental interests to demolish old dams for the purpose of restoring stream flow to facilitate the unrestricted movement of fish (cf. Watson 2000). Beyond its engineering significance, in a larger sense the remnants of this now abandoned and deteriorated dam are symbolic of the era in which America consumed almost unbelievable quantities of wood for a vast variety of purposes including household and farmstead implements (Clarke and Kohn 1976; Sloane 1965), log structures (Glassie 1968), barns (Ensminger 1992), rail fences (Zelinski 1959), covered bridges (American Society of Civil Engineers 1976), charcoal (Rolando 1992), and many other applications.

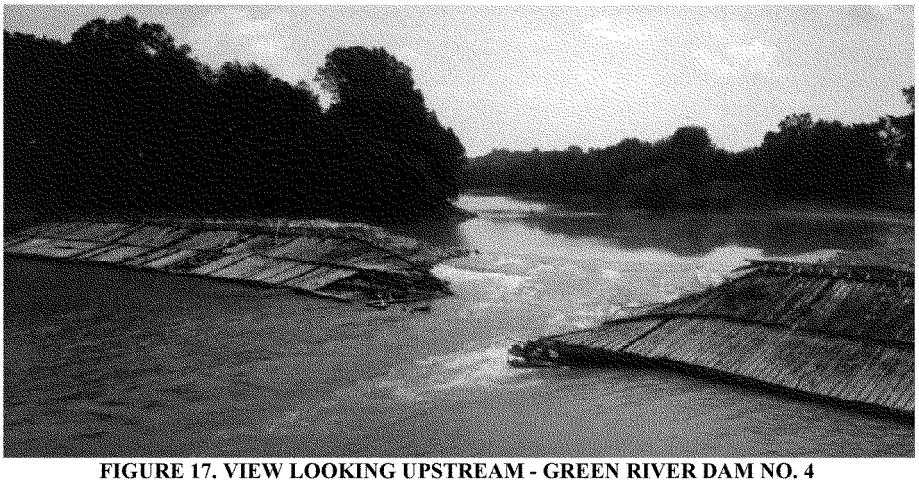


FIGURE 17. VIEW LOOKING UPSTREAM - GREEN RIVER DAM NO. 4 AS IT APPEARED ON JUNE 1, 1965, AFTER FAILING ON MAY 24, 1965. NOTE INTACT APRON ON DOWNSTREAM SIDE.

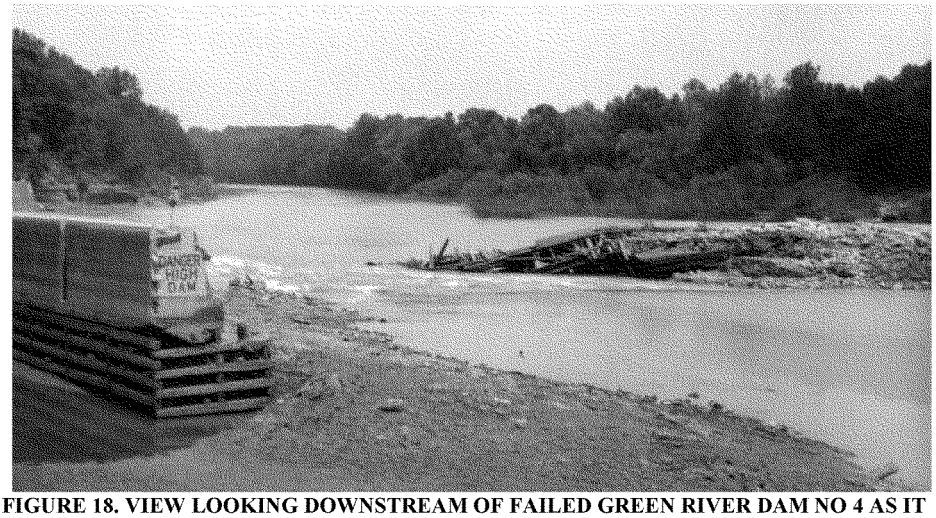


FIGURE 18. VIEW LOOKING DOWNSTREAM OF FAILED GREEN RIVER DAM NO 4 AS IT APPEARED ON JUNE 1, 1965. NOTE THAT FOUNDATION OF LOCK GUIDE WALL TO LEFT IS ALSO CONSTRUCTED OF TIMBER CRIBS FILLED WITH ROCK.



FIGURE 19. DOWNSTREAM SIDE OF DAM ADJACENT TO LOCK SHOWING DETERIORATED CONDITION IN LATE 1999. NOTE BEAMS, PEN CONFIGURATION, AND ROCK FILL.

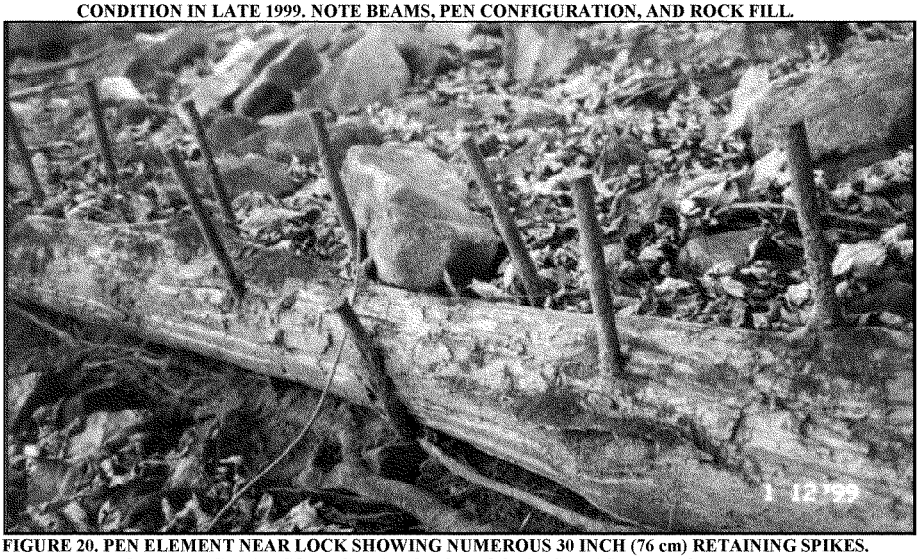


FIGURE 20. PEN ELEMENT NEAR LOCK SHOWING NUMEROUS 30 INCH (76 cm) RETAINING SPIKES. NOTE IRREGULAR CONFIGURATION OF ROCKS USED AS INTERIOR FILL.



FIGURE 21. TIERED BEAMS SHOWING STEPPED, PYRAMIDAL PROFILE OF DAM AS VIEWED FROM DOWNSTREAM SIDE ADJACENT TO LOCK WALL.

VI. CONCLUDING REMARKS

There is little doubt that the extant remnants of the upper Green River navigational system have historic value as: (1) a vestige of early efforts by the Commonwealth of Kentucky to encourage commerce within the central portion of the state; (2) their association with the subsequent "golden age" of steam boat traffic on the inland waterways of the United States; and (3) their role in reflecting the development and sequence of inland navigational facility construction methods from ca. 1840 until the mid-1930's. Accordingly, it is maintained that all of these facilities are eligible for listing in the National Register of Historic Places. It is noted that Green River Lock & Dam No. 5 has been determined not eligible for listing in the National Register of Historic Places as stated in a letter dated August 22, 1986, signed by Mr. David L. Morgan (Kentucky State Historic Preservation Officer) (**Attachment F**).

Despite these values, the continued preservation of these facilities is likely not a realistic or necessarily desirable action. Although discussions are still in progress between the Corps of Engineers and local authorities concerning disposal of the land associated with these navigational aids, the most viable uses for the properties are as county parks. Serious and appropriate concerns have been expressed by some local government officials concerning ultimate county liability for accidents occurring at these facilities after the time of transfer to local ownership. To this end, some local authorities have expressed an interest in acquiring the land only if the locks and dams are demolished prior to title transfer.

Future efforts directed toward mitigating the impacts of such transfer should reasonably take into account the condition of these remains and previous studies of the Green River system. At this time:

(1) these facilities have effectively been abandoned for variably 20 to 50 years and are in an advanced state of deterioration;
(2) the majority of the structures associated with these facilities have been demolished or already transferred out of Government ownership;
(3) one of the better preserved structures associated with this system (a former lock master's dwelling at Lock No. 4 in Woodbury, Kentucky) has already been converted into a local museum emphasizing navigation on the Green River;
(4) none of the five remaining structures (one dwelling; one office; one garage; and two poured concrete control towers) are sufficiently preserved or reasonably adaptable to public usage to warrant preservation; all have been extensively vandalized and all are located in isolated areas and extremely vulnerable to flooding;
(5) four histories regarding navigation on the Green and Barren rivers are currently available (specifically Crocker 1976; Greene 1898; Harralson 1981; and McClellan 1976);
(6) the relative architectural and industrial archaeological values of the timber crib dam at Lock No. 4 have been documented herein and are the subject of a forthcoming article in a professional journal (Ball: in press); and
(7) the series of photographs appearing in the Attachments herein serve to present an archival quality record of these facilities in their present condition.

For these reasons, it may be contended that the most productive approach to meaningful "mitigation" for the impact of these facilities leaving the ownership of the Government is through preserving a record of their history in the form of duplicating the rather extensive Green River system photographic archives and available engineering drawings relating to these properties on file with the Corps of Engineers. Copies of these materials should be placed on file with the: Kentucky Heritage Council; Kentucky Historical Society; Filson Club; University of Louisville Photographic Archives; Western Kentucky University Library Special Collections; the local museum at Woodbury, Kentucky; and other appropriate regional repositories. Additionally, some materials salvaged from these facilities might be placed with the museum in Woodbury as educational items for the benefit of the public.

ACKNOWLEDGMENTS

This report was prepared by Donald B. Ball (Archaeologist, RPA) based upon fieldwork conducted in December 1999. The author gratefully acknowledges Messrs. Charles D. Hockensmith (Kentucky Heritage Council, Frankfort, Kentucky) and Grant Day (Cultural Resource Analysts, Inc., Lexington, Kentucky) for the comparative information on dam construction they generously made available. Messrs. Charles E. Parrish and Gary Serke (Corps of Engineers, Louisville) made available historical photographs and other resources pertaining to the Green River navigation system. The photographs appearing in Attachments A-E were taken by Mr. Norman Atkins of the Louisville District staff.

REFERENCES CITED

American Society of Civil Engineers
1976 *American Wooden Bridges*. American Society of Civil Engineers, New York.

Anonymous
1965 Dam Break Halts Green River Traffic. *Courier-Journal*, Section 1, May 27, 1965, Louisville, Kentucky.

Ball, Donald B.
1998 A Phase I Cultural Resources Reconnaissance of Locks and Dams 3-6 on the Green River and Lock and Dam No. 1 on the Barren River, Kentucky. Report dated February 1998 on file Kentucky Heritage Council, Frankfort, and Office of State Archaeology, Lexington.
In Press Useful But Impermanent: The Timber Crib Dam at Lock and Dam Number 4, Green River, Kentucky. To appear in *Ohio Valley Historical Archaeology*.

Clarke, Kenneth and Ira Kohn
1976 *Kentucky's Age of Wood*. University Press of Kentucky, Lexington.

Cobb, James E.
1978 Historic Fish Traps on the Lower Holston River. *Tennessee Anthropologist* 3(1):31-58.

Condit, Carl W.
1968 *American Building: Materials and Techniques from the First Colonial Settlements to the Present*. University of Chicago Press, Chicago and London.

Council, R. Bruce
1983 Historical and Archaeological Documentation of the Wilson Mill Dam on the Ocoee River near Benton, Polk County, Tennessee. Report on file Environmental Planning Office, Tennessee Department of Transportation, Nashville.
1984 Archaeological and Documentary Investigations of the Kyker Mill Dam, Washington County, Tennessee. Report on file Environmental Planning Office, Tennessee Department of Transportation, Nashville.

Coy, Fred E., Jr., Tom Fuller, Larry G. Meadows, and Don Fig
1991 Slash Dams Used to Move Timber in Eastern Kentucky with Special References to the Red River Gorge. *Tennessee Anthropologist* 16(2):150-177.

Crocker, Helen Bartter
1976 *The Green River of Kentucky*. University Press of Kentucky, Lexington.

Ensminger, Robert F.
1992 *The Pennsylvania Barn: Its Origin, Evolution, and Distribution in North America*. Johns Hopkins University Press, Baltimore and London.

Espenshade, Christopher T. and Jeffrey W. Gardner
1989 The Meal Tastes Sweeter: Documentation of Young's Grist and Saw Mills, West Point Lake, Troup County, Georgia. Report on file U. S. Army Corps of Engineers, Mobile District, Mobile, Alabama.

Garber, D. W.
1970 Waterwheels and Millstones: A History of Ohio Gristmills and Milling. *Historic Ohio Structures Series* No. 2, Ohio Historical Society, Columbus.

Giles, Janice Holt

1964 *Run Me A River*. Houghton Mifflin Company, Boston.

Glassie, Henry

1968 The Types of the Southern Mountain Cabin. In: The *Study of American Folklore* by Jan H. Brunvand, pp. 338-370. W. W. Norton, New York.

Greene, W. P. (editor)

1898 *The Green River Country from Bowling Green to Evansville, Its Traffic, Its Resources, Its Towns and Its People*. J. S. Reilly, Evansville, Indiana (reprinted 1976, Unigraphic, Inc., Evansville).

Harralson, Agnes S.

1981 *Steamboats on the Green and the Colorful Men Who Operated Them*. Kentucke Imprints, Berea, Kentucky.

Hockensmith, Charles D.

1998 Ebenezer Stedman's Mills: A Nineteenth Century Paper, Grist, and Lumber Milling Complex near Frankfort, Kentucky. *Ohio Valley Historical Archaeology* 13:80-95.

Jackson, Donald C.

1988 *Great American Bridges and Dams*. Preservation Press, Washington, DC.

1990 (Review of) Water Mills of the Missouri Ozarks (1990) by George C. Suggs, Jr. *Industrial Archaeology* 16(2):76.

Jeane, D. Gregory

1981 Evaluation of Engineering Cultural Resources: Lock No. 3, Coosa River, Alabama. Report on file U. S. Army Corps of Engineers, Mobile District, Mobile, Alabama.

Johnson, Leland R.

1975 *The Falls City Engineers: A History of the Louisville District, Corps of Engineers, United States Army*. Louisville District, Corps of Engineers, Louisville, Kentucky.

Leffel, James

1881 *Construction of Mill Dams*. James Leffel and Company, Springfield, Ohio.

Macauley, David

1983 *Mill*. Houghton Mifflin, Boston.

McBride, Kim A., W. Stephen McBride, and Leslee F. Keys

1988 Cultural Resources Assessment of Fisher's Mill, 15JF551, Jefferson County, Kentucky. *Archaeological Report* 183, Program for Cultural Resource Assessment, Department of Anthropology, University of Kentucky, Lexington.

McClellan, William

1976 *That Last Boat in the Evening: A Profile of Rochester, Skilesville and the Mud River Country*. Privately published, place not given.

McCoy, William J., Jr.

1980 Recollections of an Early Fish Trap on the Holston River. *Tennessee Anthropologist* 5(2):179-184.

Miller, Orloff

1992 Phase III Mitigation Report on the Hahn Mill Site (36NM125), Northampton County, Pennsylvania, for Transcontinental Gas Pipe Line Corporation's 6.79 Mile Leidy Natural Gas Pipeline Expansion. Cultural Resource Division, 3D/ Environmental Services, Inc., Cincinnati.

Newman, Robert D.
1984 Archaeological Investigations at Seven Mill Sites. Report on file Archeological Services, National Park Service - Southeast Region, Atlanta, Georgia.
Pusey, William Allen
1931 Grahamton and the Early Textile Mills of Kentucky. *Filson Club History Quarterly* 5(3):123-135.
Reed, Mary Beth, J. W. Joseph, and Rita F. Elliott
1994 Historic Milling on Sandy Run and Spirit Creeks, Fort Gordon, Richmond County, Georgia. Report on file U.S. Army Corps of Engineers, Savannah District, Savannah, Georgia.
Rolando, Victor R.
1992 *200 Years of Soot and Sweat: The History and Archeology of Vermont's Iron, Charcoal, and Lime Industries*. Vermont Archaeological Society/ Mountain Publications, Manchester Center, Vermont.
Sloane, Eric
1965 *A Reverence for Wood*. Ballantine Books, New York.
Smith, Steven D. and George J. Castille, III
1986 Bailey's Dam. *Anthropological Study* No. 8, Department of Culture, Recreation and Tourism, Louisiana Archaeological Survey and Antiquities Commission, Division of Archaeology, Baton Rouge.
Starbuck, David R.
1990a Canterbury Shaker Village: Archeology and Landscape. *New Hampshire Archeologist* 31(1):1-163.
1990b The Timber Crib Dam at Sewell's Falls. *Industrial Archaeology* 16(2):40-61.
Suggs, George G., Jr.
1990 *Water Mills of the Missouri Ozarks*. University of Oklahoma Press, Norman and London.
U.S. War Department
1891-1895 *Atlas to Accompany the Official Records of the Union and Confederate Armies*. Government Printing Office, Washington.
Watson, Traci
2000 Environmental Groups Wielding Power of the Purse: Activists Offer Cash Incentives for Conservation. *USA Today*, Thursday, February 3, 2000, pg. 5A.
Wegmann, Edward
1927 *The Design and Construction of Dams*. John Wiley & Sons, New York.
Zelinski, Wilbur
1959 Walls and Fences. *Landscape* 8(3):14-20.
Zimiles, Martha and Murray Zimiles
1973 *Early American Mills*. Clarkson N. Potter, Inc./Crown Publishers, Inc., New York.

ATTACHMENT A:

PHOTOGRAPHS OF GREEN RIVER LOCK & DAM NO. 3

ERRATA:
The caption to Figure 30 should have read:
"Downstream gate of Green River Lock and Dam No. 4."
This figure should have appeared in Appendix B.
We apologize for any inconvenience.



FIGURE 22. BRICK HOUSE, LEFT OBLIQUE, VIEW TO SOUTH



FIGURE 23. BRICK HOUSE, RIGHT OBLIQUE, VIEW TO NORTH

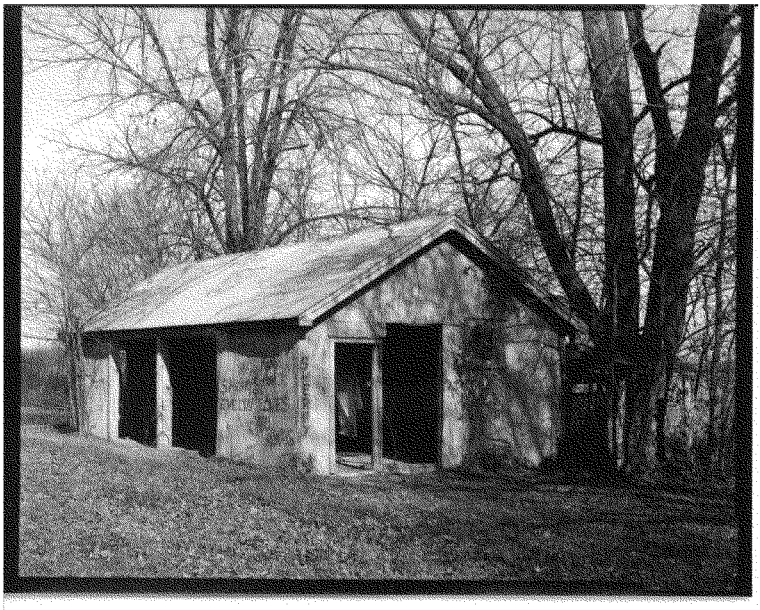


FIGURE 24. GARAGE/WORKSHED, RIGHT OBLIQUE, VIEW TO NORTHEAST.



FIGURE 25. OPERATIONS BUILDING, RIGHT OBLIQUE, TO NORTHEAST.

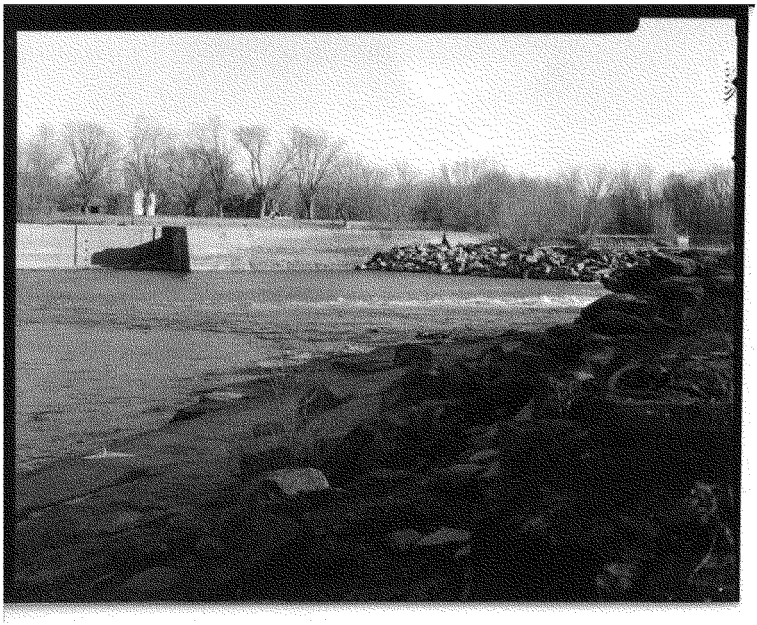


FIGURE 26. GENERAL VIEW OF LOCK COMPLEX FROM ACROSS RIVER.

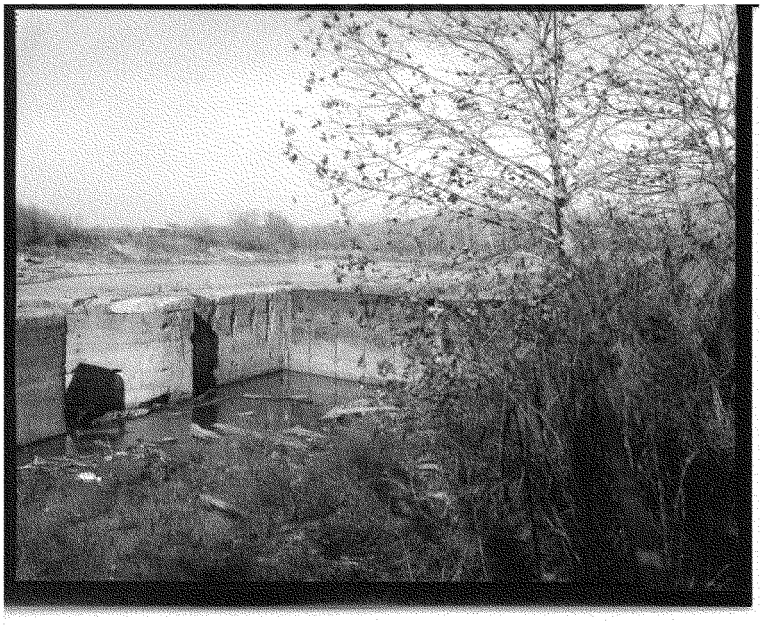


FIGURE 27. UPSTREAM ENTRANCE TO LOCK CHAMBER. VIEW TO NORTHEAST.



FIGURE 28. INTERIOR OF LOCK CHAMBER FACING DOWNSTREAM.

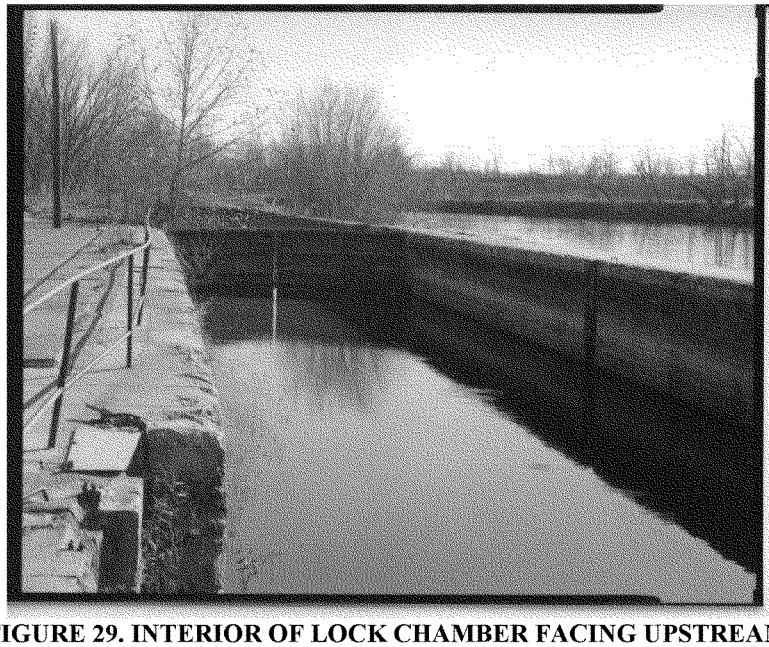


FIGURE 29. INTERIOR OF LOCK CHAMBER FACING UPSTREAM.

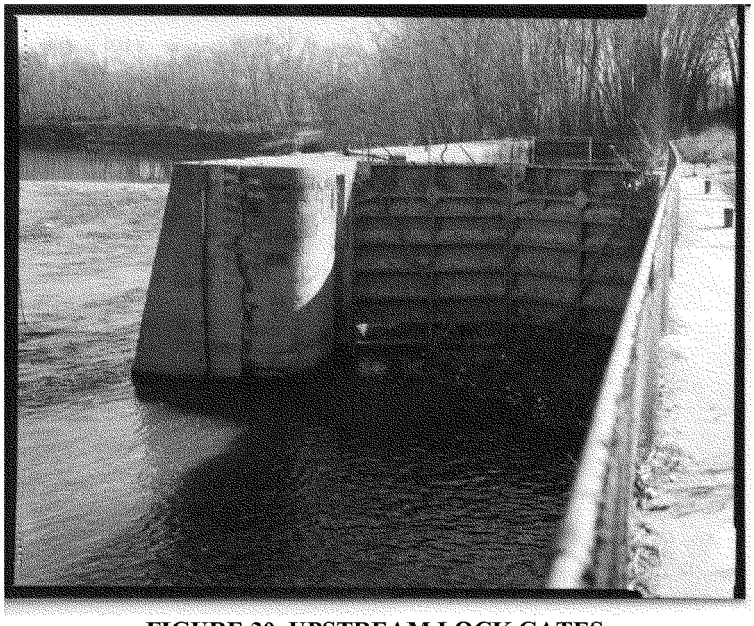


FIGURE 30. UPSTREAM LOCK GATES.

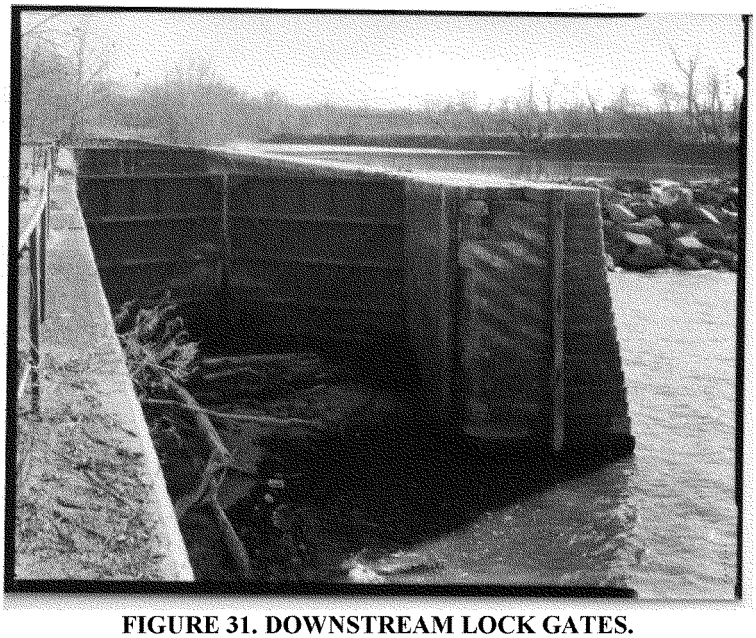


FIGURE 31. DOWNSTREAM LOCK GATES.

ATTACHMENT B:

PHOTOGRAPHS OF GREEN RIVER LOCK & DAM NO. 4.

ERRATA:
The caption to Figure 30 in Attachment A should have read:
"Downstream gate of Green River Lock and Dam No. 4."
This figure should have appeared in Appendix B.
We apologize for any inconvenience.



FIGURE 32. TREE CLOGGED NAVIGATION CHANNEL FACING UPSTREAM.

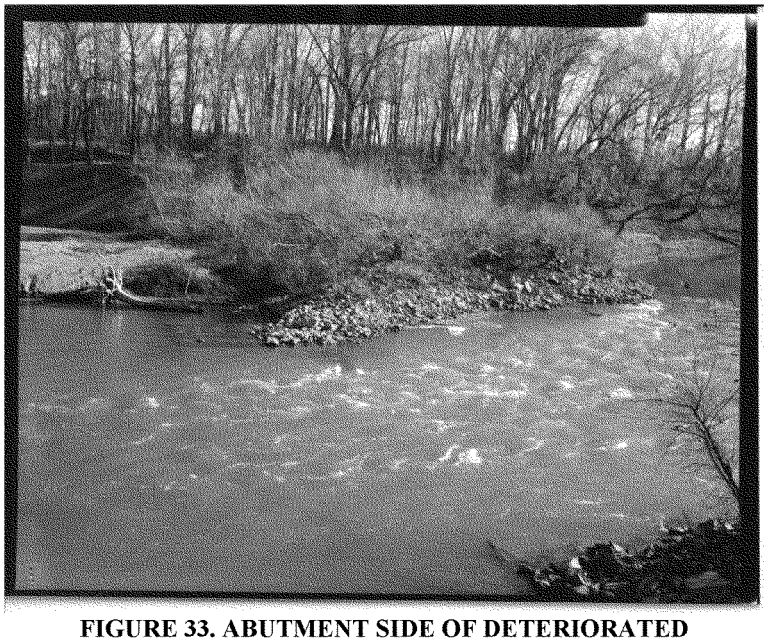


FIGURE 33. ABUTMENT SIDE OF DETERIORATED 1839 TIMBER CRIB DAM.



FIGURE 34. LOCK GATES AND OPERATING MECHANISM AT DOWNSTREAM END OF LOCK CHAMBER.



FIGURE 35. INTERIOR OF MASONRY LOCK CHAMBER FACING DOWNSTREAM.

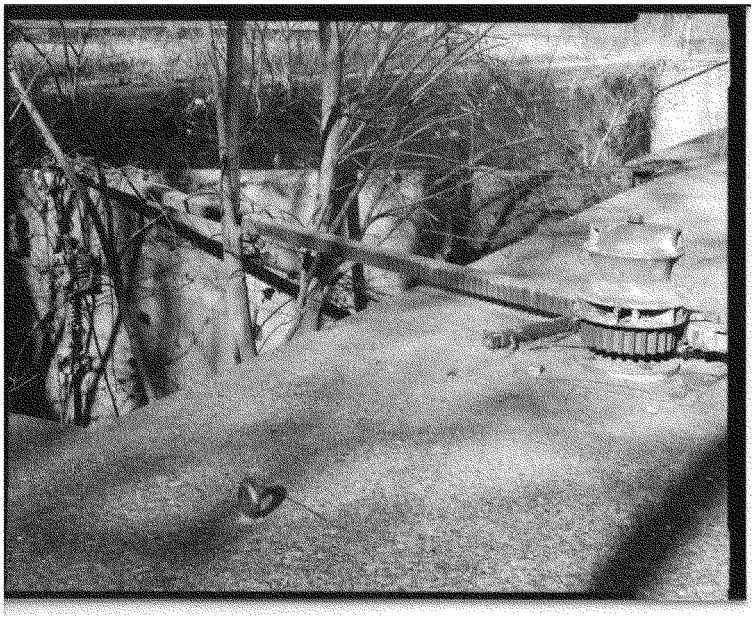


FIGURE 36. UPSTREAM GATES AND OPERATING MECHANISM.

ATTACHMENT C:

PHOTOGRAPHS OF GREEN RIVER LOCK & DAM NO. 5.



FIGURE 37. CONCRETE CONTROL TOWER AND INTERIOR OF LOCK CHAMBER.



FIGURE 38. VIEW OF SILT AND TREE CLOGGED LOWER GATES.



FIGURE 39. SILT DEPOSITS IN UPSTREAM END OF LOCK CHAMBER.



FIGURE 40. VIEW OF ABUTMENT SIDE OF DAM IN WARREN COUNTY, KENTUCKY.



FIGURE 41. DETAIL OF DOWNSTREAM LOCK GATES.

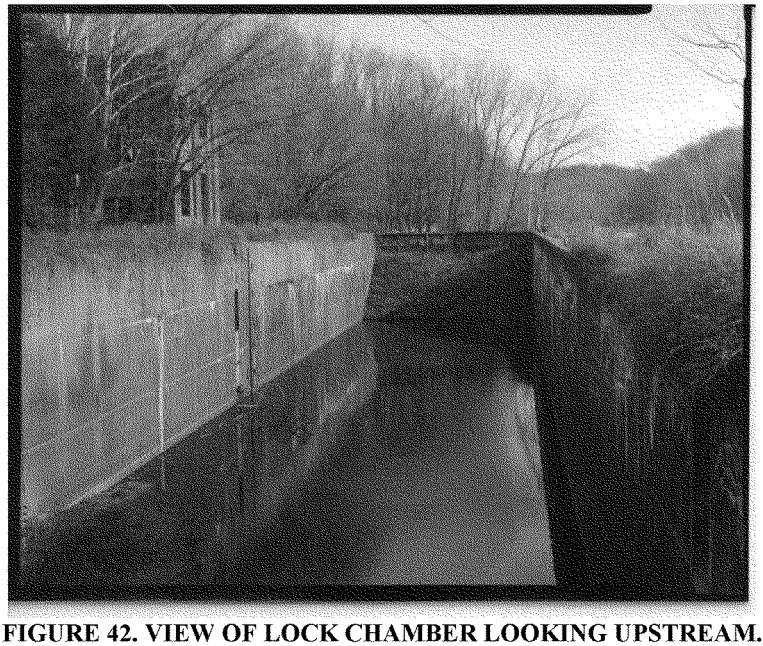


FIGURE 42. VIEW OF LOCK CHAMBER LOOKING UPSTREAM.

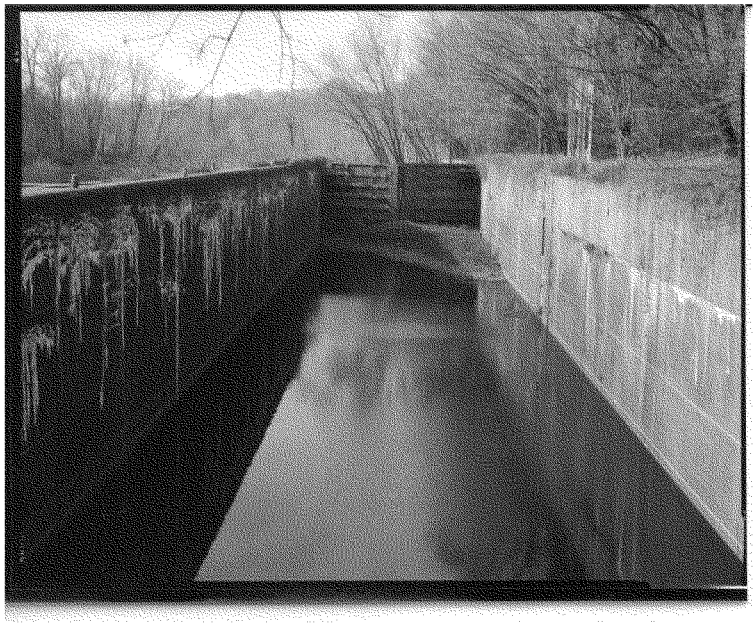


FIGURE 43. INTERIOR OF LOCK CHAMBER LOOKING DOWNSTREAM.

ATTACHMENT D:

PHOTOGRAPHS OF GREEN RIVER LOCK & DAM NO. 6.



FIGURE 44. ABUTMENT SIDE OF DAM. VIEW TO NORTH.

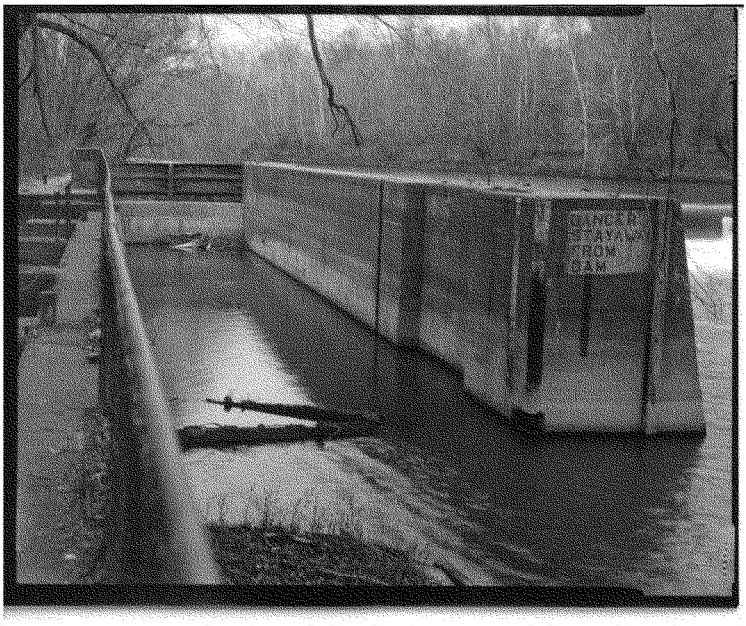


FIGURE 45. INTERIOR OF LOCK CHAMBER LOOKING UPSTREAM. NOTE COLLAPSED LOWER GATES.

ATTACHMENT E:

PHOTOGRAPHS OF BARREN RIVER LOCK & DAM NO. 1.



FIGURE 46. CONCRETE CONTROL TOWER, LEFT REAR OBLIQUE, VIEW TO SOUTHEAST.

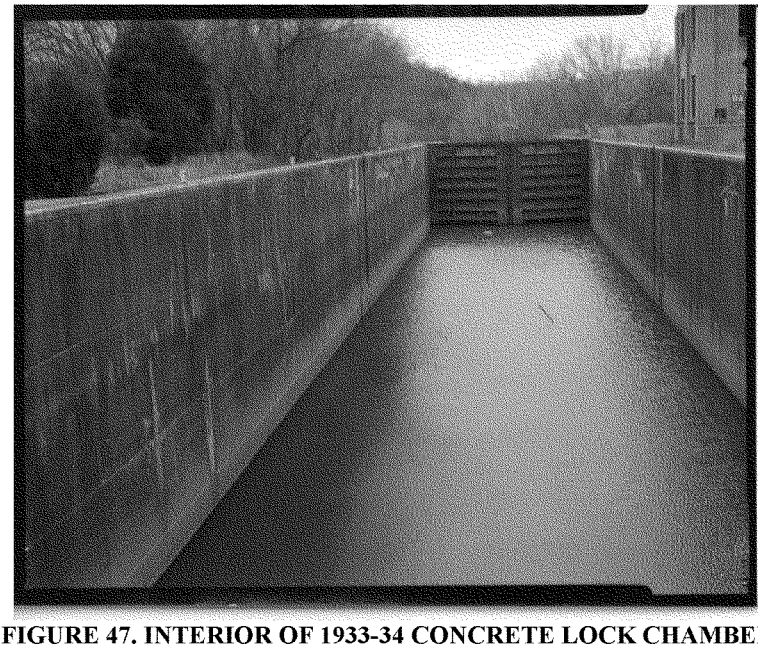


FIGURE 47. INTERIOR OF 1933-34 CONCRETE LOCK CHAMBER LOOKING DOWNSTREAM.



FIGURE 48. DOWNSTREAM GATES ON 1933-34 CONCRETE LOCK CHAMBER.

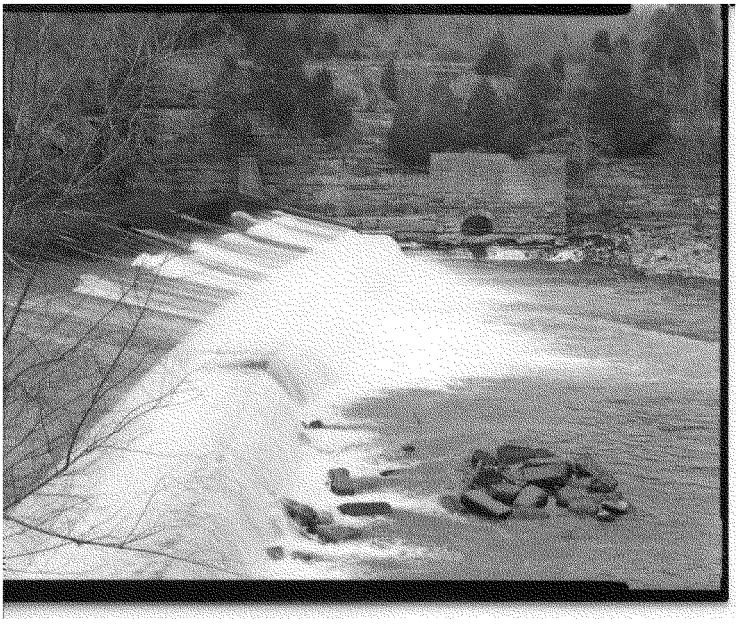


FIGURE 49. ABUTMENT SIDE OF DAM LOOKING TOWARD FOUNDATION REMNANTS OF 19th CENTURY MILL.



FIGURE 50. INTERIOR OF 1841 MASONRY LOCK CHAMBER AS VIEWED TO UPSTREAM.

ATTACHMENT F:

LETTER DATED AUGUST 22, 1986, FROM MR. DAVID L. MORGAN, KENTUCKY STATE HISTORIC PRESERVATION OFFICER

KENTUCKY HERITAGE COUNCIL
The State Historic Preservation Office

August 22, 1986

Mr. Neal Jenkins
Chief, Planning Division
Louisville District, Corps of Engineers
Department of the Army
P. O. Box 59
Louisville KY 40201-0059

Dear Mr. Jenkins:

The Kentucky Heritage Council received notice from the Kentucky State Clearinghouse on August 12, 1986 that the federal government was disposing of several tracts of property controlled by the U. S. Army Corps of Engineers. The tracts in question are:

- Portion of tracts 103, 105 and 132 and all of tracts 104-2 and 106, Barren River Lake Project, Allen and Barren Counties, Kentucky 4-D-KY-573.
- Portion of tracts A, H, I and all of tracts B, C, D and E, Green River Lock and Dam No. 5, Butler County, Kentucky, 4-D-KY-572.
- Portion of tracts A & B, Green River Lock and Dam No. 3, Muhlenberg and Ohio Counties, Kentucky, 4-D-KY-555-A.

Previously, I determined that Green River Lock and Dam No. 5 was not eligible for listing in the National Register of Historic Places. On the other hand, I concurred with the Corps in a letter dated June 17, 1986 that Green River Lock and Dam No. 3 is eligible for listing in the National Register and enclosed "Concensus Determination of Eligibility" form for this property. It is not clear from the notices whether the Locks and Dams are included in the surplus tracts since no maps or tract descriptions were provided by the General Services Administration.

Would you please advise me as to the nature of cultural resource investigations undertaken at the referenced tracts? Specifically, would you inform me whether each tract was subjected to an intensive archaeological survey and whether standing structures were assessed to determine if any properties eligible for listing in the National Register of Historic Places are present? I would appreciate copies of any survey reports prepared for these projects. Thank you for your assistance.

(continued)

12th Floor, Capital Plaza Tower Frankfort, Kentucky 40601 Telephone (502) 564-7005

Should you have any questions, feel free to contact Charles Hockensmith at (502) 564-6661.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer

DLM/rm

Appendix B:
Geotechnical and Structural Analyses

APPENDIX B
GEOTECHNICAL AND STRUCTURAL

1.0 General

On December 2-3, 2013, Robert Wheeler (ED-T-G), Tim Wessel (ED-DS), Dale Polston (ED-M-C), Leslie Williams (RE), Drew Russell (PM-P-E), Michael Turner (PM-P), and Nathan Moulder (PM-P) were accompanied by Sherri Alderson (Green River Area Lockmaster) and Sean Bennett (Green River Area Maintenance) to Green River Locks and Dams 3, 4, 5, 6, and Barren River Lock and Dam 1. The purpose of these site visits was to assess the condition of the structures, compare the condition of the structures to previous study, and identify actions or repairs which would be necessary to dispose of these projects. These assessments focused on any actions deemed necessary to maintain pool where required; and to provide adequate public safety at each structure. Restoration of operational capability or other work outside the minimum required to ensure stability was not considered. Currently the projects are not operational and have been placed in "caretaker" status. A discussion of the assessment of each of the structures follows.

2.0 Green River Lock and Dam 3.

This structure was originally constructed in 1833-1836 and consists of a 35.8 feet x 137.5 feet lock and about 353 feet of timber cribbing and rock fill dam. Photographs of the project are shown in Figures GR3-1 through GR3-12.

Since routine maintenance was no longer performed on the project, significant siltation has continued to occur around the miter gates and in the lock approaches. Considerable debris had accumulated in the area downstream of the lower miter gates, and the upstream approach has heavy siltation (Figure GR3-5).

2.1 Geotechnical Assessment

From a stability standpoint, the majority of the project appeared to be in satisfactory condition. The exception to this observation is the rock filled timber cribbing portion of the downstream guide wall, which is in a condition of failure (Figure GR3-6). This wall appears to have deteriorated more since the last inspection in 1998. It has continued to settle and rotate riverward significantly, and it appears a portion of the wall has fallen down or been eroded away completely.

The walls of the lock, constructed of cut stone masonry, show signs of significant surficial weathering; however, the walls do not show evidence of settlement or movement which would cause concern from a stability standpoint. No change was noted from the 1998 inspection.

The miter gates appear to be in the same condition as the 1998 inspection. The gates remain clogged with debris / sediment and not fully closed. Additional trees and under growth have increased around the gates and along the land wall of the lock.

The dam appears intact, stone fill was observed for the entire length of the dam. Historical records indicate an old mill race was located along the left bank, and more flow was observed through this area at the time of the site visit (same as previous inspection in 1998).

2.2 Structural Assessment

The lockmaster's house and one maintenance shed are still in existence. The primary maintenance/office building has burned down since the previous inspection in 1998. The house roof is in poor condition and is in a state of failure. The brick walls are still intact and are not in any danger of imminent collapse (Figure GR3-7). The esplanade, although cracked, can still adequately support vehicular traffic (Figure GR3-8).

The lock walls are in good condition. They are constructed of cut stone masonry. Their alignments are straight and there appears to be no signs of settlement. There are some root intrusions under the first layer of limestone blocks on the riverside (Figures GR3-3 & GR3-4). The downstream bullnose is losing some of its limestone blocks on the downstream end of the wall. This loss is far enough away from the downstream miter gates that it should not have an effect on the gate's structural integrity (Figure GR3-9).

The portions of the miter gates that are visible appear to be in good condition overall. Structural members look sound. Connections and welds appear to be intact, however there are some visible signs of rusting and pitting of the steel (Figure GR3-10). The gates were not mitered completely due to some debris stuck between them but the pool was not compromised due to the heavy siltation build up and woody vegetation growth in front of the upstream and especially the downstream gates.

The upstream guard wall is made of timber piling and appears to be in good condition (Figure GR3-11). The downstream guide wall is made of timber cribbing and has failed. It is not impacting the rest of the project.

The dam consists of large derrick stones placed on timber cribbing. It appears to be stable (Figure GR3-12).

2.3 Recommendations

Structurally, the lock and dam system looks sound and, except for the downstream guide wall, does not appear to be in any danger of immanent failure.

The site investigation did not reveal any conditions at this structure which would result in the loss of pool in the near future. However, during the time of the inspection the upstream miter gates were not fully mitered and pool was being held by the downstream miter gates. This is acceptable and repair actions are not considered necessary prior to disposition. However,

to maintaining pool for long term consideration, a concrete plug could be placed against the upstream face of the upstream miter gates. This same fix was proposed in a recent study conducted at Green River Lock and Dam #3 and can be found in the Engineering Documentation Report, Remedial Suite No. 2 provided by Stantec Consulting Services dated April 13, 2011.

To keep people off the dam side lock wall, the upstream and downstream miter gates could be gated off with fan fencing barricades on the land side miter gates. The siltation and vegetation of the chamber is substantial enough to act as egress (Figures GR3-3 & GR3-4). It is expected for the sediment to continue to collect in the lock camber provided the upstream and downstream miter gates remain closed / mitered.

3.0 Green River Lock and Dam 4.

This structure was originally constructed in 1834-1839 and consists of a 35.8 feet x 138 feet lock and about 409 feet of timber cribbing and rock fill dam. In May of 1965 the dam was breached and navigation upstream of this lock was suspended. Photographs of the project are shown in Figures GR4-1 through GR4-10.

Due to the breach of the dam, there was no pool differential, and the upstream approach to the lock was completely silted in, with significant tree growth (Figure GR4-5). A major section of the dam was gone due to the breach (Figure GR4-6). Significant siltation had occurred downstream of the right bank abutment of the dam.

3.1 Geotechnical Assessment

From a stability standpoint, the majority of the project with the exception of the upstream guard wall appeared to be in satisfactory condition (same as previous inspection in 1998). There is no water impounded by this project so loss of pool is not a consideration here. The upstream guard wall has settled and rotated landward, and is in a condition of total failure, being held up by heavy tree growth (Figure GR4-7). This appears to be in the same condition as it was in the previous inspection. The walls of the lock, constructed of cut stone masonry, show signs of significant surficial weathering with weeds and brush growing through the walls in several places; however, the walls do not show evidence of settlement or movement and appear to be in the same condition as noted in the previous inspection in 1998.

3.2 Structural Assessment

The esplanade appears to be in good condition and can still support vehicular loads (Figure GR4-8). The lock wall alignments are straight and there appears to be no settlement. There is some root intrusion in some of the limestone block joints. Also, there are some limestone block faces that have spalled off due to freeze-thawing. But overall, the lock walls are considered to be structurally sound (Figures GR4-3 & GR4-4).

Due to the breach in the dam, the upstream approach channel is completely silted in, with significant tree growth. This tree growth has caused the upstream approach wall, which is constructed of wood cribbing, to fail by rotating landward. It appears the wall rotation has been stabilized by the tree growth and silt on either side.

The upstream miter gates are holding back a significant amount of silt and tree growth. All visible structural member connections look sound (Figures GR4-10). The downstream miter gate is missing its members at and below the waterline, and there is some visible rusting and pitting of the rest of the gates (Figures GR4-9).

The downstream guide wall has good alignment and does not show any signs of settlement. The condition of the concrete appears satisfactory (Figures GR4-1).

3.3 Recommendations

No actions are recommended for the section of the upstream guard wall which has failed. Should the wall continue to rotate, it will not cause any damage.

Structurally the lock and downstream guide wall do not appear to be in any danger of failure. No conditions were observed at the site which would further impair the stability of this structure. In the long term, it is recommended that the brush growing through the lock walls be killed and cut off to prevent the brush growth from causing damage to the walls.

To keep people off the river side lock wall, the upstream and downstream miter gates could be gated off with fan fencing barricades on the land side miter gates. The siltation and vegetation of the chamber is substantial enough to acts as egress (Figures GR4-3 & GR4-4) along with the deterioration of the lower downstream miter gates (Figure GR4-9). It is expected for the sediment to continue to collect in the lock camber provided the upstream and downstream miter gates remain closed / mitered.

4.0 Green River Lock and Dam 5.

This structure was originally put in operation in 1900. A new lock was built in 1933-1934, when the old structure was removed. The new structure consists of a 56 feet x 360 feet lock and approximately 300 feet of concrete dam. Photographs of the Project are shown in Figures GR5-1 through GR5-8.

A significant amount of siltation is occurring around both the upstream and downstream gates, inside and outside of the lock chamber as also noted in the 1998 inspection. Trees are observed growing in the channel immediately upstream and downstream of the chamber. Both land and

river walls are covered with minor amounts of weeds and brush with some growing through the lock land wall, and a few small damp spots on the land wall indicated some minor seepage through the wall.

4.1 Geotechnical Assessment

From a stability standpoint, the majority of the project appeared to be in same satisfactory condition as reported during the previous inspection in 1998. Leakage was observed around the upstream riverward gate leaf during the previous inspection and appears to be unchanged. The lock walls, and dam, which are concrete, appeared to remain stable and in good condition. Some minor weathering and spalling of surficial concrete was again observed, but the lock walls do not show evidence of settlement or movement which would cause concern from a stability standpoint.

4.2 Structural Assessment

As previously stated, the Green River Lock and Dam 5 project site actually contains generations of project sites. All that is left of the original 1900 lock is the landside lock and guide walls (Figure GR5-7). At the newer lock site, the esplanade has been removed and vegetation has replaced it. The only remains from the Lockmaster's houses are the building foundations, some filled in cisterns, and steps that lead up to the yard area.

The concrete lock walls have good alignment and show no signs of settlement. There are some visible cracks, but the overall conditions of the lock walls are good. The upper and lower guide walls have excellent alignment, show no signs of settlement, and look in very good condition (Figures GR5-2 through GR5-4). This lock system also used two sheet pile cells as part of the river side upstream guard walls. These cells, which are linked together by walkway planks, appear to be in good condition (Figure GR5-8).

The miter gates are holding back a significant amount of silt and tree growth. At least 3/4 of the upper gate and half of the lower gates are covered by silt (Figures GR5-2 & GR5-3). The structural member connections that are visible look sound. There is some visible rusting and pitting of the steel. The concrete dam, though underwater at the time of the visit, appears to be in good condition. Since the dam is underwater, any potential undermining, underseepage, or other structural deterioration is unknown (Figure GR 5-6). The only way to fully assess the condition of the dam would be when the flow was sufficiently low that water was not passing over the dam. This flow condition is very rare.

The two story control tower is missing window panes but otherwise appears in good condition (Figure GR5-4). There is no exposed reinforcing and the condition of the concrete is good. The spiral stairs are still intact that provides access to the second level. The balcony at the second level is still structurally sound and is in good condition. Additionally, a lifting beam was observed on site that could be salvaged.

4.3 Recommendations

No conditions were observed at this site which would result in the loss of pool in the near future. The condition of the miter gates appear to be satisfactory. If the upper set of miter gates were to fail, the lower set would provide the redundancy needed to maintain the pool until a fix (rock plug, sheet pile cut off, etc.) could be reestablished on the upstream end of the lock.

To keep people off the dam side lock wall, the upstream and downstream miter gates could be gated off with fan fencing barricades on the land side miter gates and insure the land side valve pits and bulkhead slots grates are bolted securely. The siltation and vegetation of the chamber is substantial enough to acts as egress (Figures GR5-2 & GR5-3). It is expected for the sediment to continue to collect in the lock camber provided the upstream and downstream miter gates remain closed / mitered.

5.0 Green River Lock and Dam 6.

This structure was built in 1904-1905 and consists of a 36 feet x 145 feet lock and approximately 220 feet of concrete and stone dam. In 1989, repairs were made to the structure by placing a sheet pile cutoff upstream of the upper gates and into the right bank. The upper gates were also partially encased in concrete. This work was performed as the result of major seepage through the lock chamber, and end-around seepage occurring through the right bank. Photographs of the project are shown in Figures GR6-1 through GR6-9.

Since the downstream gates have been removed siltation has not occurred around the upstream and downstream gates, inside and outside of the lock chamber. However, debris has accumulated in the upper approach area, and between the sheet pile cutoff and the upper gates (Figure GR6-7). Some spalling was evident on the lock walls (Figure GR6-3).

5.1 Geotechnical Assessment

From a stability standpoint, there are still some items of concern related to this project. Most notably are the seepage conditions still evident through and around the lock wall cutoff, right bank and land lock wall. Low areas/Sinkholes were still evident in the right bank indicating seepage was still occurring but no changes were noted from the previous inspection in 1998. Clear water was observed seeping under the land wall into the lock chamber. The flow into the chamber is not caused by a culvert failure because the lock chamber utilized valves located in the miter gates. At the end of the lower approach wall, where the wall runs into the bank, the wall appears to have settled and rotated outward at the top but does not look different than what was observed during the 1998 inspection (Figures GR6-6 and GR6-8). Upstream, the upper approach wall directly above the sheet pile cutoff wall remains in a state of failure (Figure GR6-7).

5.2 Structural Assessment

The concrete in the lock walls appear to be undergoing some deterioration but are in satisfactory condition overall. The alignment still appears to be good with no visible signs of settlement (Figure GR6-4).

Most of the upper guide and guard walls are made of timber pilings and timber rails. These have been taken over by trees growing through the rails (Figures GR6-5, GR6-9). The complete failure of this wall section will not affect the river flow, or pool. The portion of the upper landside guide wall next to the upper gates is made up of concrete monoliths and is rotating with the growth of trees. A section of this wall was removed for the placement of the sheet pile cutoff wall. The approach channel has become blocked by silt, debris, and vegetation.

The concrete dam, though underwater at the time of the visit, appears to be in good condition. Since the dam is underwater, any potential undermining, underseepage, or other structural deterioration is unknown (Figure GR6-1). The only way to fully assess the condition of the dam would be when the flow was sufficiently low that water was not passing over the dam. This flow condition is very rare.

The lower landside guide wall is constructed of approximately 150 feet of concrete monoliths. The end of the wall cuts back into the bank approximately 30 feet. It has good alignment, and shows no signs of settlement, except for the tie-back portion of the wall. There is an approximate 2 inch gap in the joint between the second and third monolith. This has not changed since the 1998 inspection (Figure GR6-1). There are concrete steps on the outside of these monoliths that provide access from the bank to the water's edge utilized by area fishermen. They descend about 30 vertical feet. The major portion of these steps has rotated away from the monoliths approximately 3 inches. This has not changed significantly since the 1998 inspection (Figure GR6-6). This rotation appears to be independent of the gap between the monoliths described above. Any failure of the steps or cut back portion of the wall will not adversely affect river flow.

The downstream miter gates have been cut off and are lying in the chamber. The upper gates were encased in concrete to a height equal to that of the dam.

5.3 Recommendations

It appears that the guide and guard wall sections will not cause damage or concern should they continue to move. Therefore, no repair action is recommended. Lock walls appear stable with no repair action recommended. Also, egress for this structure is not an issue since the downstream gates have been removed.

6.0 Barren River Lock and Dam 1.

This structure was originally constructed in 1841. The new lock was built between 1933-1934 and incorporated into the old one. The new lock is a 56 feet x 360 feet lock. A concrete cutoff wall was placed across the upstream sill of the old lock (Figure BR1-7). The dam is approximately 276 feet long, and consists of a concrete covered timber cribbing structure. Photographs of the project are shown in Figures BR1-1 through BR1-12.

A significant amount of siltation has occurred upstream of the lock, and trees were observed growing in the upstream approach channel. Trees were also observed growing through holes in the old lock walls (Figure BR1-10). Wet spots on the lock land wall indicated water was seeping through cracks in the wall. No changes were noted from the previous inspection in 1998.

6.1 Geotechnical Assessment

From a stability standpoint, the majority of the project appeared to be in satisfactory condition. The lock walls, which are concrete, appeared to be in good condition, with the exception of minor weathering (no change from previous inspection in 1998). The downstream side of the dam appeared to have some surficial damage, as indicated by zones of turbulent water flow (Figure BR1-8). The dam appeared to be in the same condition as the previous inspection with the exception of the left most portion of the dam. At the time of inspection the left most portion of the dam appeared to be slightly shifted/tilted toward the opposite bank (see red circle in Figure BR1-8). However, it was difficult to determine with additional water flowing over the dam during this inspection. The lock walls still do not show evidence of settlement or movement which would cause concern from a stability standpoint. The miter gates appear to be in good condition. No changes noted on the lock structure since the previous inspection in 1998.

6.2 Structural Assessment

The overall structural condition of Barren River Lock and Dam 1 project appears to be good. The two story control tower is missing window panes and has evidence of bullet holes, but there is no exposed reinforcing and the overall condition of the concrete is good (Figure BR1-2). The esplanade, although cracked, can still adequately support vehicular loads (Figure BR1-9).

The portions of the miter gates that are visible appear to be in good condition. Approximately 1/3 of the gates have silt against them (Figure BR1-6). All structural members look sound, and all connections and welds appear to be intact.

The lock, guide, and guard walls are in good condition (Figures BR1-1 & BR1-5). Their alignments are straight and the condition of the concrete is good. Some of the bulkhead slots, piping, and valve pits are missing their gratings. These have been removed in order to place rock in them, thereby reducing an entrapment hazard.

The old lock chamber was put out of service by placing a concrete cutoff wall across the upstream sill, and putting rock fill in the rest of the chamber. This concrete cutoff wall appears to be in good condition (Figure BR1-7). There was not much evidence of the rock fill in the chamber on this visit due to high water. Some of the rock or fill may have settled or washed away (Figure BR1-7).

Additionally, two dewatering beams were observed on site that appeared to be in good condition. These could be scrapped, or salvaged and reused at another project site (FigureBR1-12).

The concrete dam, though underwater at the time of the visit, appears to be in about the same condition as the 1998 inspection. There appears to be some indication of through seepage. Since the dam is underwater, any potential undermining (through seepage or other structural deterioration) is unknown (Figure BR 1-8). The only way to fully assess the condition of the dam would be when the flow is sufficiently low and water is not passing over the dam. This flow condition is very rare.

6.3 Recommendations

At the time of this report, no work is recommended for improving the stability of this project. However, there is some concern about the stability of the dam. To eliminate this concern, a cutoff would need to be established upstream of the dam. The most effective means of cutoff would be a single row of sheet piling driven immediately upstream of the upstream face of the dam. The area between the sheet pile wall and sloping face of the dam would then be filled with large-size stone. This is similar to a repair technique used on the Kentucky River Locks but would prove to be very expensive and not even known to be warranted at this time.

No conditions were observed at this site which would result in the loss of pool in the near future. The conditions of the miter gates appear to be satisfactory. If the upper set of miter gates were to fail, the lower set would provide the redundancy needed to maintain the pool until a fix (rock plug, sheet file cut off, etc) could be reestablished on the upstream end of the lock.

To keep people off the dam side lock wall, the upstream and downstream miter gates could be gated off with fan fencing barricades on the land side miter gates. Egress is provided at this structure through the following ways: ladders located on the lock walls (Figure BR1-2), vegetation and concrete berm just downstream of upstream miter gates (Figure BR1-3 & BR1-4), and the accumulated siltation located near the miter gates (though hard to see this in the photographs from this inspection due to high water during the time of inspection).

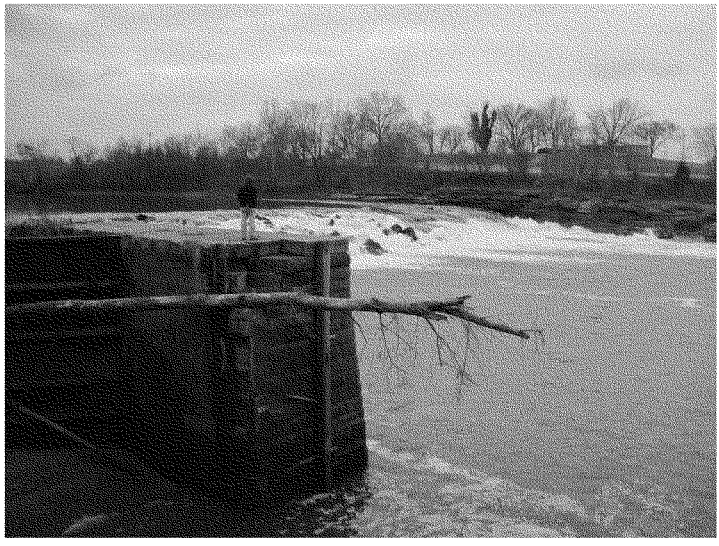


Figure GR3-1: Downstream River Wall and Dam of Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-2: Over grown area around Lock Master's house at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-3: Lock chamber looking upstream from river wall at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-4: Lock chamber looking downstream from river wall at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-5: Upstream approach channel from river wall at Green River Lock and Dam #3 (Dec. 2013)

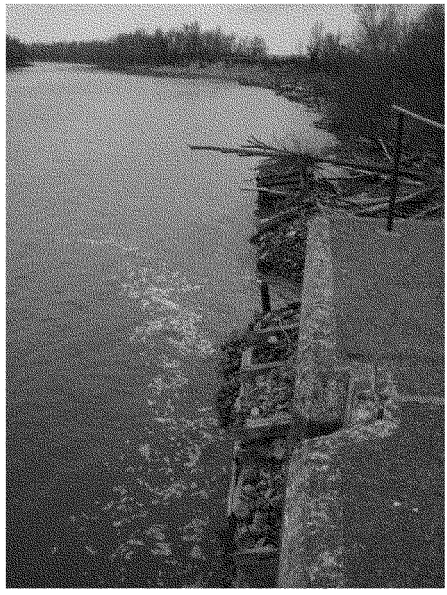


Figure GR3-6: Downstream land side approach wall failure at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-7: Lock Master's House at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-8: Esplanade at Green River Lock and Dam #3 (Dec. 2013)

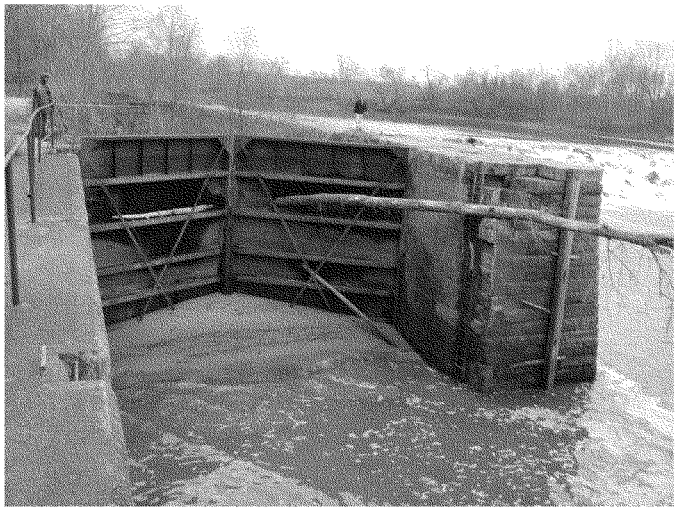


Figure GR3-9: Downstream bullnose and miter gates at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-10: Downstream miter gates at Green River Lock and Dam #3 (Dec. 2013)



Figure GR3-11: Downstream miter gates at Green River Lock and Dam #3 (Dec. 2013)

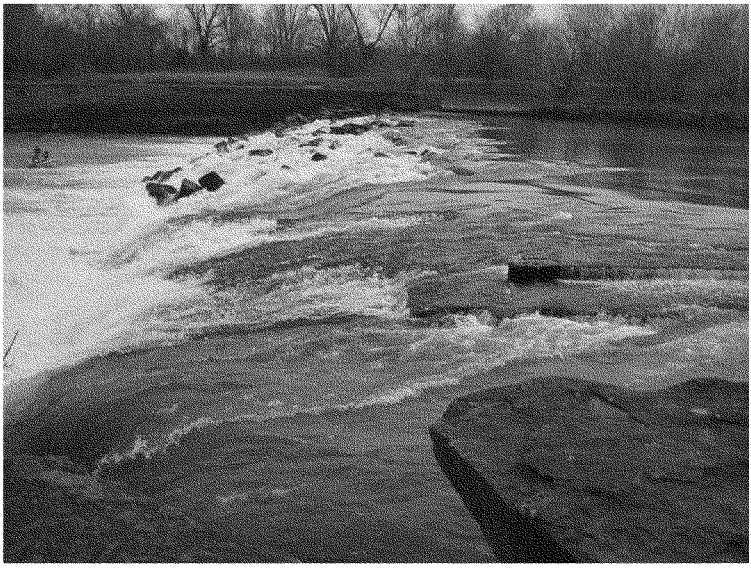


Figure GR3-12: Dam at Green River Lock and Dam #3 (Dec. 2013)

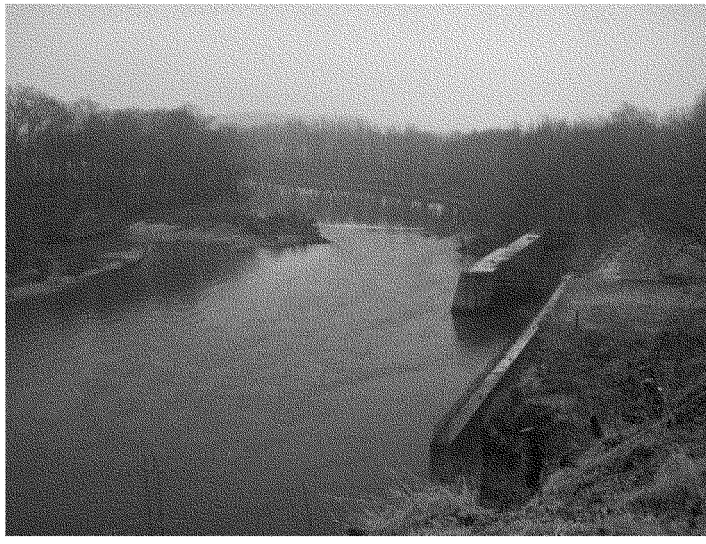


Figure GR4-1: Green River Lock and Dam #4 from Lock Master's House (Dec. 2013)

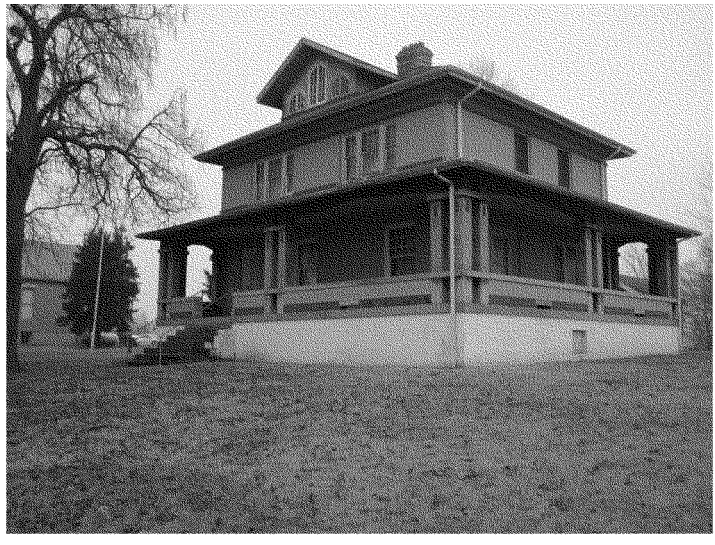


Figure GR4-2: Lock Master's house at Green River Lock and Dam #4 (Dec. 2013)



Figure GR4-3: Lock chamber looking upstream from river wall at Green River Lock and Dam #4 (Dec. 2013)



Figure GR4-4: Lock chamber looking downstream from upstream miter gates at Green River Lock and Dam #4 (Dec. 2013)



Figure GR4-5: Upstream approach channel from upstream miter gates at Green River Lock and Dam #4 (Dec. 2013)

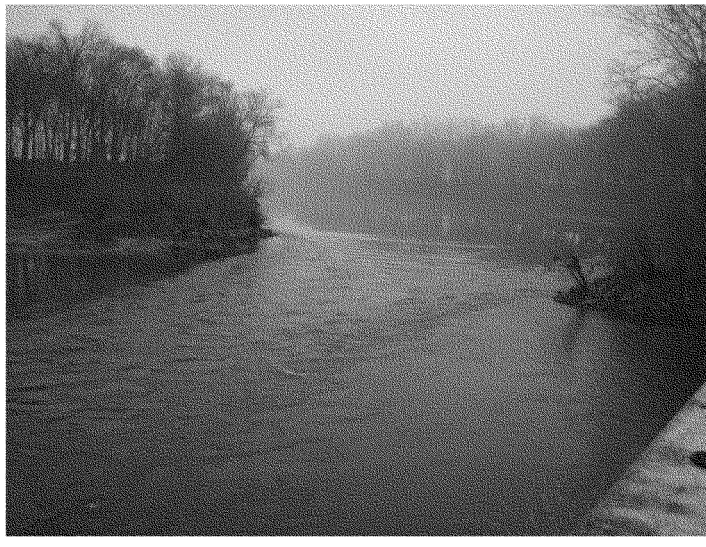


Figure GR4-6: Section of dam missing due to breach at Green River Lock and Dam #4 (Dec. 2013)



Figure GR4-7: Upstream river side approach wall failure at Green River Lock and Dam #4 (Dec. 2013)



Figure GR4-8: Esplanade at Green River Lock and Dam #4 (Dec. 2013)

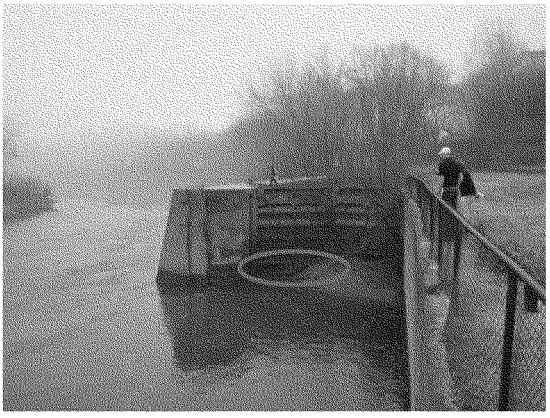


Figure GR4-9: Missing structural members at and below the water line, Green River Lock and Dam #4 (Dec. 2013)

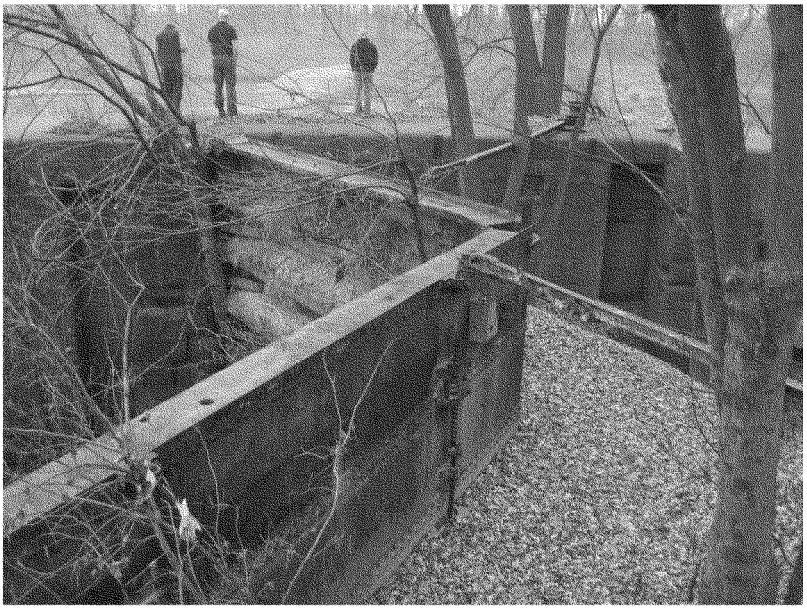


Figure GR4-10: Upstream miter gates holding back a significant amount of silt and tree growth, Green River Lock and Dam #4 (Dec. 2013)

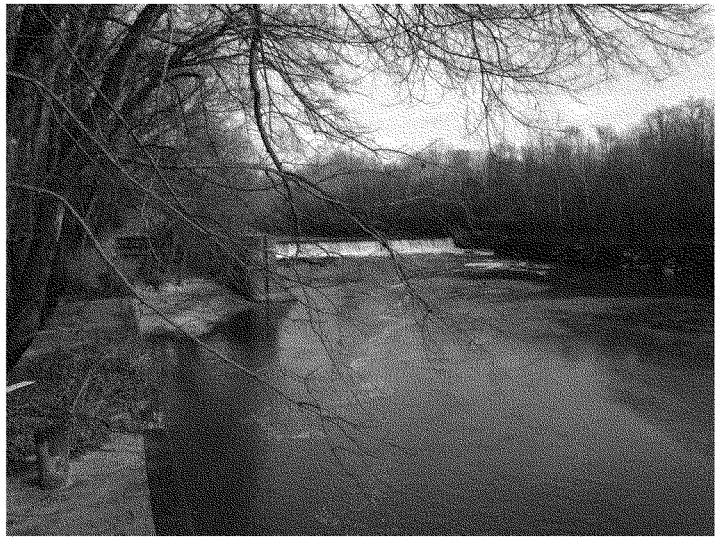


Figure GR5-1: View of Green River Lock and Dam #5 from downstream land wall (Dec. 2013)



Figure GR5-2: Siltation of lock chamber and vegetation at Green River Lock and Dam #5 looking upstream from downstream miter gates (Dec. 2013)



Figure GR5-3: Siltation of lock chamber and vegetation at Green River Lock and Dam #5 looking downstream from upstream miter gates (Dec. 2013)



Figure GR5-4: Power House located on the land side wall at Green River Lock and Dam #5 (Dec. 2013)



Figure GR5-5: Upstream approach channel from river wall at Green River Lock and Dam #5 (Dec. 2013)

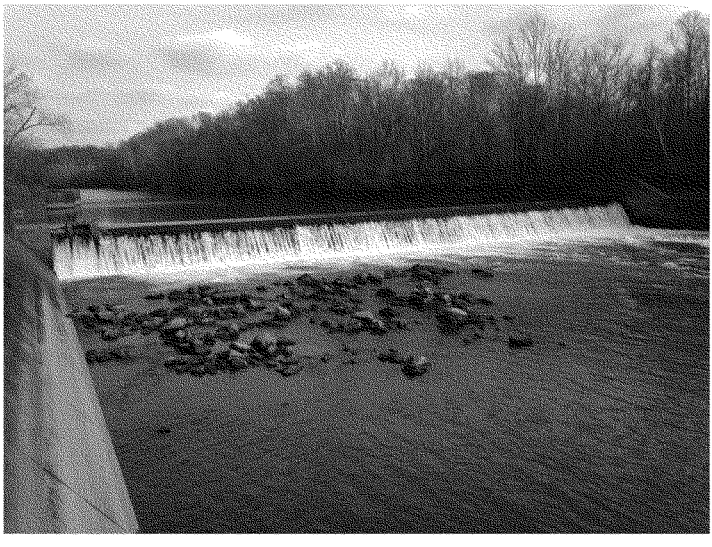


Figure GR5-6: Dam from river wall at Green River Lock and Dam #5 (Dec. 2013)



Figure GR5-7: View of the original 1900 Green River Lock and Dam #5 site as viewed from the newer 1934 Green River Lock and Dam #5, river wall (Dec. 2013)



Figure GR5-8: Upstream guard cells with walkway planks looking downstream (Dec. 2013)

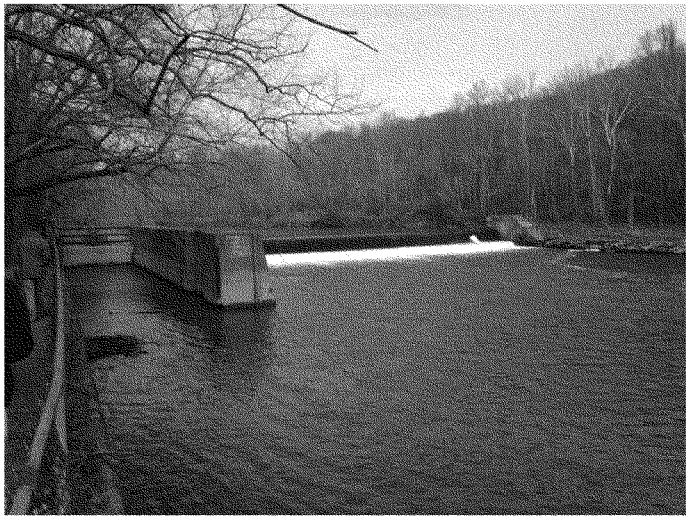


Figure GR6-1: Lock chamber and dam from downstream land wall at Green River Lock and Dam #6 (Dec. 2013)

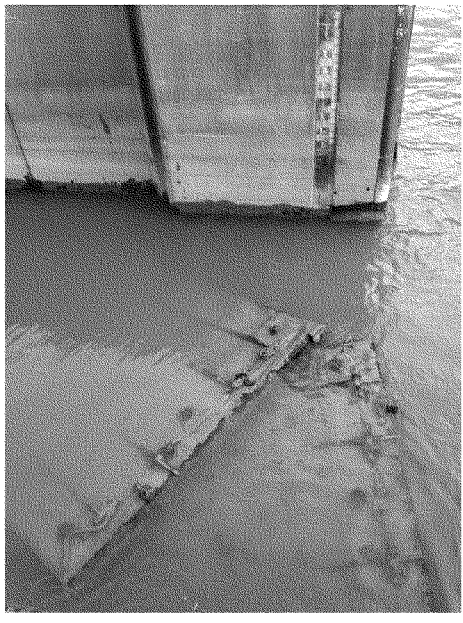


Figure GR6-2: Downstream miter gates have fallen into lock chamber at Green River Lock and Dam #6 (Dec. 2013)

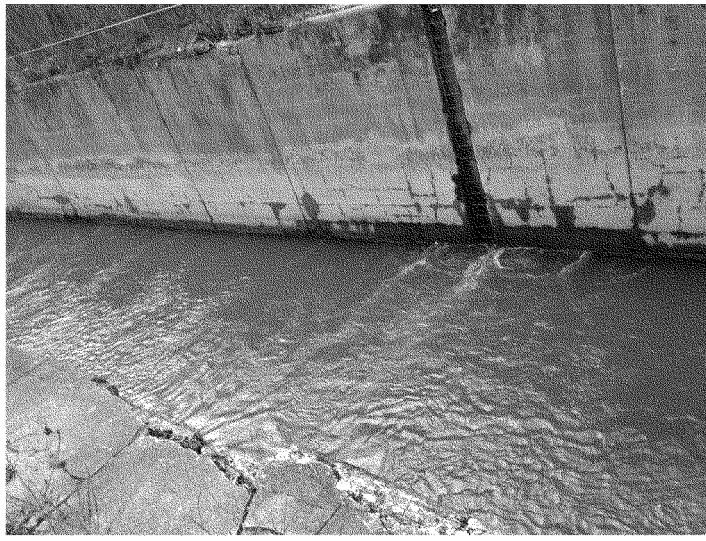


Figure GR6-3: Lock chamber looking downstream from river wall at Green River Lock and Dam #6 – note seepage under lock wall at ladder (Dec. 2013)

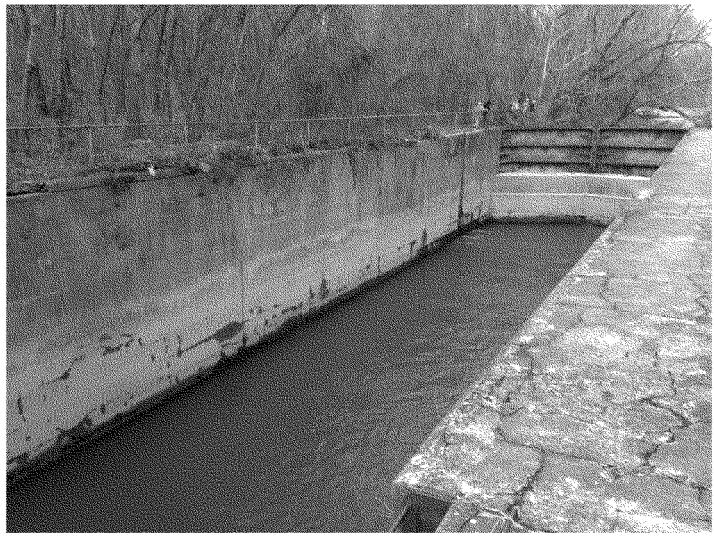


Figure GR6-4: Lock chamber looking upstream from river wall at Green River Lock and Dam #6 (Dec. 2013)



Figure GR6-5: Upstream approach channel from right river bank just upstream of Green River Lock and Dam #6 (Dec. 2013)



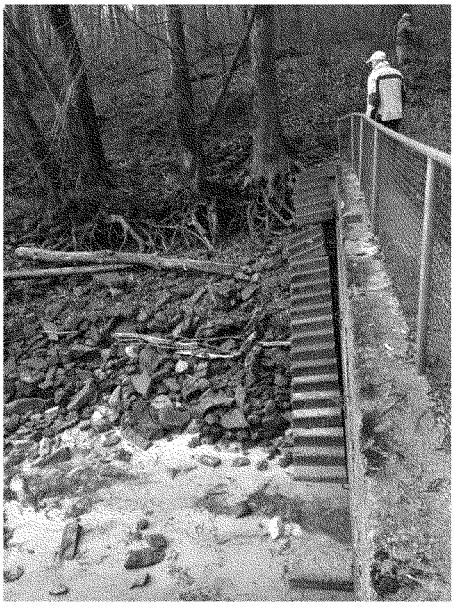


Figure GR6-6: Downstream land wall stairs failure at Green River Lock and Dam #6 (Dec. 2013)



Figure GR6-7: Upstream sheet pile wall in front of miter gates at Green River Lock and Dam #6 (Dec. 2013)



Figure GR6-8: Gap in monolith joint on end of downstream lock wall at Green River Lock and Dam #6 (Dec. 2013)



Figure GR6-9: Upstream approach channel Guard wall at Green River Lock and Dam #6 (Dec. 2013)

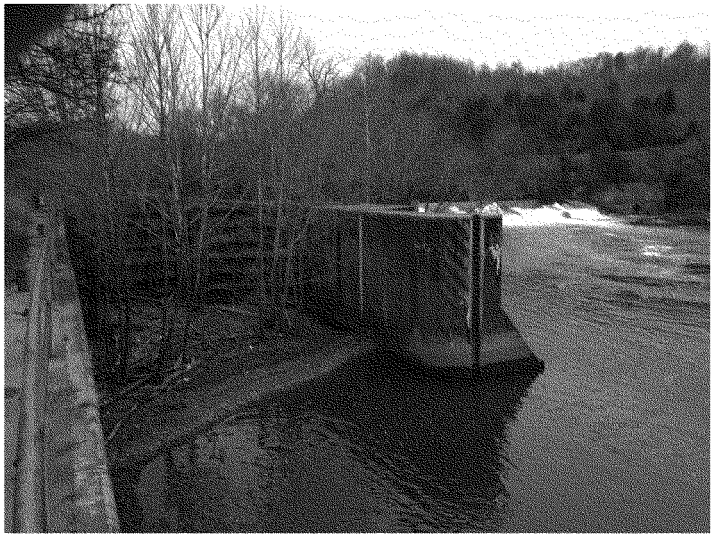


Figure BR1-1: Downstream River Wall and Dam of Barren River Lock and Dam #1 (Dec. 2013)

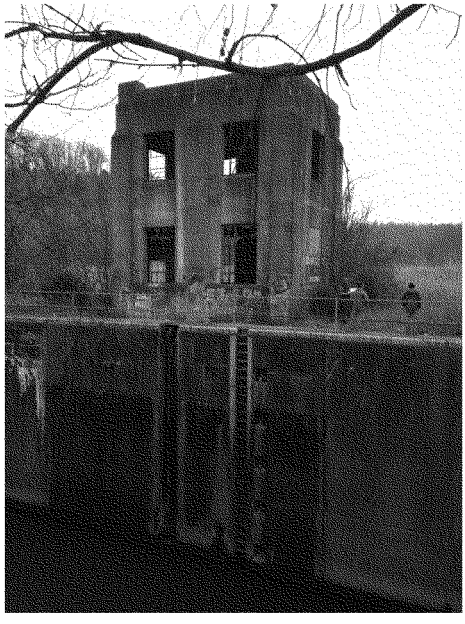


Figure BR1-2: Over grown area around Power House on river wall at Barren River Lock and Dam #1 (Dec. 2013)

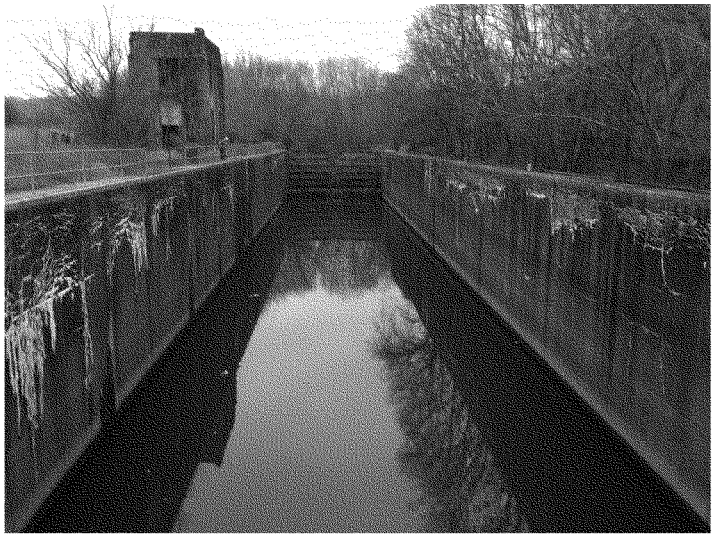


Figure BR1-3: Lock chamber looking upstream from downstream miter gates at Barren River Lock and Dam #1 (Dec. 2013)

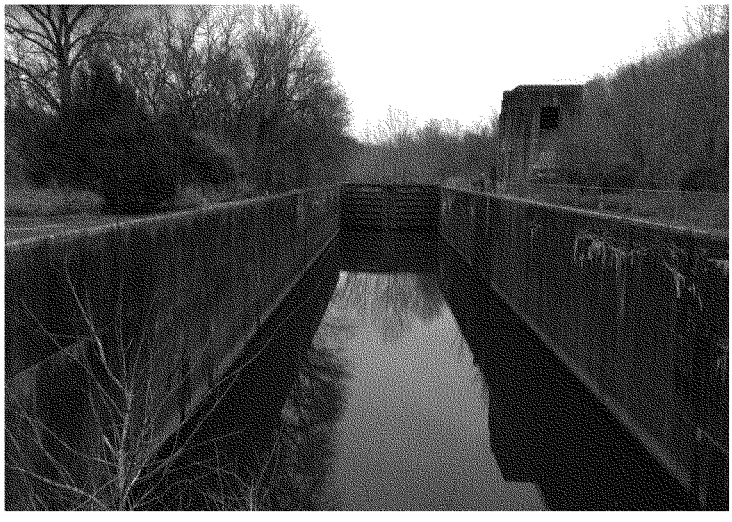


Figure BR1-4: Lock chamber looking downstream from upstream miter gates at Barren River Lock and Dam #1 (Dec. 2013)



Figure BR1-5: Upstream approach channel from river wall at Barren River Lock and Dam #1 (Dec. 2013)



Figure BR1-6: Siltation downstream of downstream miter gates at Barren River Lock and Dam #1 (Dec. 2013)

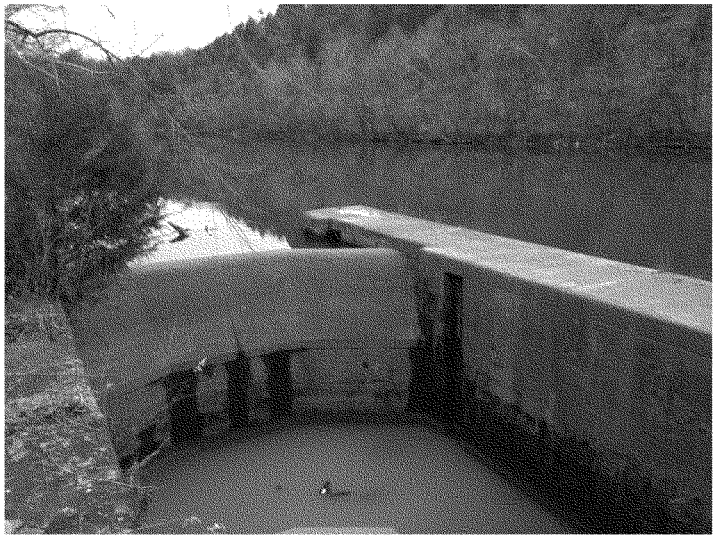


Figure BR1-7: Concrete cutoff placed across upstream sill of the old lock chamber at Barren River Lock and Dam #1 (Dec. 2013)



Figure BR1-8: Dam with old lock chamber in the foreground at Barren River Lock and Dam #1. Circled area is of turbulent water flow noted during inspection (Dec. 2013)



Figure BR1-9: Esplanade with control tower in the background at Barren River Lock and Dam #1 (Dec. 2013)



Figure BR1-10: Old lock chamber at Barren River Lock and Dam #1 (Dec. 2013)



Figure BR1-11: Old lock chamber with rock fill at Barren River Lock and Dam #1 (Dec. 2013)



Figure BR1-12: dewatering beams at Barren River Lock and Dam #1 (Dec. 2013)

Appendix C:
Hydrologic and Hydraulic Analyses

Green and Barren Rivers Locks and Dams - Disposition Study

HYDROLOGY AND HYDRAULICS
APPENDIX C

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Green and Barren Rivers Locks and Dams - Disposition Study

HYDROLOGY AND HYDRAULICS
APPENDIX C

History

The Barren River, a tributary of the Green River, and the Green River, a tributary of the Ohio River, have been used for commercial navigation purposes since the mid 1700's. The first structural improvements to aid navigation were constructed in the 1830's with additional improvements built periodically since that time. Green River Lock and Dam 6 and Barren River Lock and Dam 1, were the most upstream in a series of navigation structures constructed from the mouth of Green River. Each project was constructed to maintain a minimum six foot navigation channel.

Green River Lock and Dam 1 - Original construction 1835-1840, new lock placed in operation June 18,1956
Green River Lock and Dam 2 - Old lock and dam rebuilt 1893-1895, new lock placed in operation May 25, 1956
Green River Lock and Dam 3 - Original construction 1833-1836
Green River Lock and Dam 4 - Original construction 1834-1839, dam was breached May 24, 1965 and closed to traffic
Green River Lock and Dam 5 - Old lock placed in operation January 17, 1900, new lock placed in operation December 22, 1934, deactivated August 31, 1951
Green River Lock and Dam 6 - Original construction 1904-1905, deactivated August 31, 1951
Barren River Lock and Dam 1 - Original construction 1841, new lock placed in operation September 17, 1934, closed to navigation with breach of Green River Lock and Dam 4

General Study Purpose

This report was prepared by the Louisville District, Corps of Engineers (COE) under the authority of Section 216 of the Flood Control Act of 1970. The intent of this analysis was to identify low flow duration and a range of frequency water surface elevations for existing conditions, with Green River Dams 3 through 6 and Barren River Dam 1 removed and various combinations of leave-in-place and removal alternatives.

Portions of the Green River valley subject to flooding by the Green and Barren Rivers are addressed in this appendix. The properties in the Green River and Barren River floodplain, although largely undeveloped at present, are inundated almost annually by floodwaters. These open areas are coming under increasing development pressures as the growth in the Green River valley progresses. However, usage during low flow periods, thereby lower water surface elevations, are also addressed in this appendix and may be more germane to this study.

Basin Characteristics

The headwaters of the Green River begin in central Kentucky in Lincoln County and generally flow westward for 370 miles to its confluence with the Ohio River at river mile 784. In the headwater area, the stream slope is about four feet per mile and drops to a gradient of about 0.25 feet per mile in the extreme lower reaches of the stream. The overall average stream slope is about two feet per mile.

Major tributaries of the Green River include Rough, Barren, and Nolin Rivers, all located in the south central portion of the state. The total drainage area of the Green River basin is 9,230 square miles.

The headwaters of the Barren River begin in north central Tennessee and generally flow northwestward for approximately 140 miles to its confluence with Green River at river mile 149.5. In the headwater area, the stream slope is about three feet per mile and drops to a gradient of about one foot per mile in the extreme lower reaches of the stream. The overall average stream slope is about 1.6 feet per mile.

Pertinent drainage areas within the study limits are shown in Table 1. A significant amount of karst topography lies within the Green River drainage basin and does not contribute directly to surface runoff.

TABLE 1

GREEN RIVER BASIN DRAINAGE AREAS

STREAM AND LOCATION	MILES ABOVE MOUTH	DRAINAGE AREA (Square Miles)	
Green River at Green River Lake	305.7	682	(0.6)
Green River at Munfordsville	225.9	1,673	(176)
Green River at Mammoth Cave	197.2	1,983	(444)
Green River above Nolin River	183.5	2,031	(463)
Nolin River at Nolin River Lake	7.8	703	(223)
Nolin River at Kyrock	7.4	707	(223)
Nolin River at mouth	0.0	727	(223)
Green River including Nolin River	183.5	2,758	(686)
Green River at Brownsville at Lock and Dam 6	181.7	2,762	(687)
Green River at Naker / Glenmore at Lock and Dam 5	168.1	3,001	(697)
Green River above Barren River	149.5	3,140	(703)
Barren river at Barren River Lake	79.2	942	(77)
Barren River at Bowling Green	37.6	1,849	(487)
Barren River at Greencastle at Lock and Dam 1	15.0	1,968	(568)
Barren River at mouth	0.0	2,264	(656)
Green River including Barren River	149.5	5,404	(1,359)
Green River at Woodbury at Lock and Dam 4	149.1	5,404	(1,359)
Green River at Rochester at Lock and Dam 3	108.5	6,142	(1,380)
Green River above Rough River	71.3	6,431	(1,401)
Rough River at Rough River Lake	89.4	454	(107)
Rough River at mouth	0.0	1,081	(134)
Green River including Rough River	71.3	7,512	(1,534)
Green River at Calhoun at Lock and Dam 2	63.3	7,566	(1,534)
Green River including Pond River	55.1	8,423	(1,568)
Green River at Spottsville at Lock and Dam 1	9.1	9,183	(1,576)
Green River at mouth	0.0	9,230	(1,576)

( ) non-contributing drainage area - karst topography

Historic Floods

Generally, the Green River basin flood season extends from early winter through late spring. High water occurs almost annually in the Green River basin and in many years multiple flood events have been observed. Highwater marks were set for a number of floods since 1913 with the January 1937 and the March 1962 events being major floods in the study reach. Plates 1 through 3 show selected Green River highwater profiles of a number of floods in the basin. Plate 4 presents selected Barren River highwater profiles and Plate 5 presents selected Nolin River highwater profiles. (It should be noted that the highwater profiles were last revised in 1972).

Projects Affecting the Study Area

A system of flood control reservoirs were constructed by the U.S. Army Corps of Engineers on the Green River and three of its main tributaries to reduce flood damage in the basin. These projects, the drainage area they control and the date they were put into operation are as follows:

Rough River Lake, 454 square miles, (December 1960)
Nolin River Lake, 703 square miles, (March 1963)
Barren River Lake, 942 square miles, (May 1964)
Green River Lake, 682 square miles, (February 1969)

It is estimated that Nolin and Green River Lakes would combine to reduce a flood equal to that of January 1937 by about 9 feet at Lock 6, Brownsville, Kentucky, and all four Corps projects would combine for an estimated 2.3 foot reduction at Lock 2, Calhoun, Kentucky. Significant flood reductions will dissipate downstream of Lock 2 at a point where the contributing influence of the Ohio River backwater dominates.

Gaged Flow Data

Numerous U.S. Geological Survey (USGS) gaging stations have been maintained in the study reach of the Green and Barren Rivers. The USGS gaging stations records provided stage and discharge data. Flood peak data were extracted from the period of record for each gaging station and were the basis for computing the percent chance exceedence flood events presented in this report. Table 2 lists the period of record observed annual peaks for the available gaging stations. These data are actual recorded peak values and not homogeneous as they contain both natural and modified (pre and post Green, Nolin, Barren and Rough River Lakes) values. Funding to keep gaging stations in operation is limited and is reflected in discontinuance at several sites.

TABLE 2

ANNUAL PEAKS - DISCHARGE AND STAGE

GREEN RIVER AT MUNFORDVILLE, KY.

Drainage Area = 1,673 sq. mi. Gage Datum = 451.70 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1/__/13	67,000	54.00	2/1/57	31,600	36.94
12/19/15	39,500	40.80	11/21/57	36,500	39.40
1/7/17	31,400	35.60	1/23/59	23,000	31.34
1/31/18	28,500	33.20	11/28/59	13,500	21.17
1/3/19	31,500	35.70	3/1/61	18,400	26.91
1/11/20	36,300	39.50	3/1/62	76,800	57.72
3/11/21	23,000	18.20	3/8/63	23,500	31.86
3/25/22	21,400	26.70	3/11/64	43,900	42.95
12/10/24	37,800	40.00	3/31/65	25,400	33.33
1/24/26	19,200	24.60	2/15/66	15,900	24.16
2/24/27	37,000	39.60	3/8/67	33,700	37.83
6/11/28	24,100	29.20	4/6/68	37,700	39.83
3/1/29	26,800	31.50	*4/19/69*	*12,700*	*20.14*
2/6/1930	16,300	21.80	*4/3/70*	*24,500*	*32.70*
3/30/31	12,000	17.45	*12/23/70*	*17,900*	*26.31*
1/31/32	37,600	39.90	*2/26/72*	*23,800*	*32.08*
1/24/33	31,600	35.70	*12/10/72*	*25,000*	*33.10*
3/6/34	30,900	35.10	*1/12/74*	*45,000*	*43.48*
1/22/35	44,900	43.40	*3/14/75*	*49,500*	*45.76*
3/28/36	23,400	28.50	*3/31/76*	*21,500*	*29.98*
1/23/37	60,000	50.40	*3/13/77*	*18,300*	*26.75*
3/7/38	15,600	22.40	*12/6/77*	*21,300*	*29.81*
2/6/39	30,100	34.50	*12/10/78*	*61,500*	*51.89*
4/2/40	21,700	28.60	*6/8/81*	*22,200*	*30.58*
7/20/41	15,300	23.03	*9/3/82*	*23,500*	*31.75*
4/11/42	19,800	27.74	*5/17/83*	*31,500*	*36.60*
1/1/43	40,500	41.20	*5/8/84*	*65,300*	*53.78*
4/14/44	20,300	28.49	*11/20/84*	*18,600*	*27.04*
1/3/45	36,100	38.65	*2/18/86*	*14,700*	*22.62*
1/10/46	19,600	27.24	*3/1/87*	*23,400*	*31.73*
5/23/47	21,000	28.41	*1/21/88*	*18,500*	*27.90*
4/15/48	43,700	42.42	*2/16/89*	*44,700*	*43.00*
2/17/49	45,900	43.34	*2/5/90*	*28,100*	*32.16*
1/8/50	42,900	42.45	*12/19/90*	*27,500*	*31.01*
1/16/51	22,400	30.78	*12/4/91*	*20,300*	*27.30*
3/25/52	56,100	48.31	*2/22/93*	*13,300*	*20.07*
5/21/53	23,300	31.67	*3/11/94*	*35,000*	*39.64*
4/18/54	16,800	25.08	*5/20/95*	*34,400*	*39.18*
03/24/55	35,000	38.64	*12/8/96*	*16,200*	*23.14*
2/20/56	36,300	39.29	*3/3/97*	*40,600*	*43.30*

TABLE 2 (Continued)

GREEN RIVER AT MUNFORDVILLE, KY. (Continued)

Drainage Area = 1,673 sq. mi. Gage Datum = 451.70 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
4/17/98	*22400*	*28.5*	*12/1/04*	*20300*	*25.27*
1/10/99	*23200*	*29.16*	*9/24/06*	*21500*	*27.68*
3/21/00	*18700*	*25.01*	*1/8/07*	*15500*	*21.50*
12/17/00	*17300*	*23.45*	*4/5/08*	*24800*	*30.50*
3/21/02	*22200*	*28.29*	*1/29/09*	*27200*	*32.65*
2/17/03	*27700*	*32.99*	*5/4/10*	*56900*	*51.88*
2/7/04	*22600*	*28.66*	*4/13/11*	*29700*	*34.68*

Green River Lake placed in operation beginning February 1969

GREEN RIVER AT MAMMOTH CAVE, KY.

Drainage Area = 1,983 sq. mi. Gage Datum = 420.52 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1913	----	50.5	1/2/43	41,700	38.1
1935	51,600	42.6	4/14/44	21,600	24.5
3/28/36	23,400	26.5	1/4/45	35,700	34.6
1/24/37	75,000	52.0	2/16/46	20,200	23.4
3/7/38	15,300	19.8	5/23/47	20,100	23.3
2/6/39	29,800	31.7	4/16/48	45,200	40.1
4/4/40	20,000	23.5	2/18/49	51,400	43.0
7/21/41	15,200	19.2	1/9/50	49,200	42.0
4/12/42	21,300	24.3		Discontinued	

Green River Lake placed in operation beginning February 1969

TABLE 2 (Continued)

NOLIN RIVER AT KYROCK, KY.

Drainage Area = 703 sq. mi. Gage Datum = 400.0(NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
4/27/31	3,390		*3/6/77*	*5,680*	
1/30/32	22,700		*12/27/77*	*7,860*	
3/3/40	10,500		*12/26/78*	*11,200*	
7/19/41	4,540		*10/18/79*	*7,160*	
4/9/42	7,360		*5/26/81*	*4,380*	
3/20/43	8,800		*9/9/82*	*7,180*	
4/11/44	6,820		*5/27/83*	*10,300*	
3/1/45	10,600		*5/21/84*	*8,480*	
2/15/46	8,850		*1/21/85*	*10,000*	
1/2/47	8,940		*12/2/85*	*4,650*	
2/13/48	14,700		*12/12/86*	*4,950*	
2/17/49	11,700		*1/8/88*	*4,970*	
12/13/49	13,600		*3/17/89*	*10,100*	
5/9/61	12,600	43.95	*2/27/90*	*8,710*	
2/27/62	12,600	59.27	*1/26/91*	*7660*	*37.23*
3/23/63	*9,120*	*38.27*	*7/8/92*	*5,860*	*34.82*
3/26/64	*9,620*	*40.06*	*2/27/93*	*5,020*	*33.89*
12/1/64	*13,100*	*42.70*	*3/5/94*	*6030*	*42.93*
2/25/66	*5,640*	*32.91*	*6/1/95*	*7290*	*43.05*
5/23/67	*6,980*	*39.17*	*6/18/96*	*4260*	*32.37*
6/5/68	*5,520*	*41.19*	*3/27/97*	*6910*	*49.52*
2/5/69	*4,790*	*33.70*	*1/13/98*	*4010*	*32.22*
5/7/70	*8,220*	*39.58*	*2/5/99*	*4230*	*29.21*
3/24/71	*9,540*	*38.37*	*2/26/00*	*3660*	*29.05*
3/13/72	*9,990*	*41.40*	*2/22/01*	*5440*	*28.87*
7/24/73	*6,200*	*36.60*	*5/1/02*	*5480*	*29.05*
12/6/73	*10,100*		*5/12/03*	*6200*	*34.94*
4/7/75	*8,420*		*6/9/04*	*7560*	*37.2*
3/3/76	*6,790*			Discontinued	

Nolin River Lake placed in operation beginning March 1963

TABLE 2 (Continued)

GREEN RIVER AT LOCK 6, BROWNSVILLE, KY.

Drainage Area = 2,762 sq. mi. Gage Datum = 413.03 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1/20/07	34,000	25.3	1/9/50	55,900	33.40
2/16/08	28,000	20.0	3/25/52	66,900	37.15
2/26/09	45,900	31.2	5/20/53	32,500	22.85
6/13/10	31,000	22.0	4/19/54	20,400	16.57
5/2/11	49,400	32.6	3/26/55	38,100	27.82
4/4/12	34,800	26.0	2/3/56	44,000	30.10
1/10/13	103,000	42.8	2/2/57	38,000	27.52
5/7/14	30,600	21.8	11/21/57	55,300	34.15
2/3/15	33,200	24.4	1/24/59	33,700	23.48
12/19/15	51,300	33.0	1/16/60	19,000	16.05
1/7/17	38,600	27.1	3/8/61	32,900	23.07
1/31/18	29,800	21.1	3/2/62	90,200	41.85
1/4/19	61,000	35.6	*3/8/63*	*27,200*	*19.84*
1/11/20	52,900	33.2	*3/12/64*	*46,300*	*30.6*
4/2/21	19,100	16.1	*3/31/65*	*32,700*	*22.96*
2/23/22	33,200	23.6	*2/14/66*	*18,900*	*16.02*
2/5/23	42,100	29.0	*3/9/67*	*35,700*	*25.04*
1/5/24	36,800	26.2	*4/7/68*	*39,300*	*26.95*
12/11/24	39,000	27.4	*4/20/69*	*16,200*	*15.12*
1/24/26	34,000	24.0	*4/4/70*	*27,200*	*19.82*
1/24/27	55,700	34.3	*12/24/70*	*21,700*	*17.20*
6/11/28	32,900	23.4	*2/27/72*	*30,500*	*21.77*
2/28/29	32,600	23.1	*12/11/72*	*30,200*	*22.63*
2/6/30	23,200	17.6	*1/13/74*	*48,500*	*31.50*
3/30/31	12,000	14.2	*3/15/75*	*53,000*	*33.12*
2/1/32	47,700	30.8	*3/31/76*	*26,100*	*20.12*
1/24/33	35,900	25.6	*3/14/77*	*20,600*	*17.05*
3/6/34	32,900	23.1	*1/27/78*	*25,500*	*19.66*
1/23/35	55,000	33.7	*12/11/78*	*70,100*	*37.26*
4/9/36	29,300	20.8	*12/15/79*	*26,500*	*20.37*
1/24/37	120,000	44.94	*6/9/81*	*26,000*	*20.00*
3/16/38	19,400	16.20	*9/4/82*	*24,800*	*19.24*
2/3/39	35,600	26.10	*5/19/83*	*37,000*	*26.44*
4/22/40	25,100	18.48	*5/9/84*	*73,000*	
7/20/41	17,700	15.83	*11/20/84*	*20,900*	*17.16*
4/11/42	26,400	19.55	*2/19/86*	*18,400*	
3/22/43	45,500	29.13	*3/2/87*	*28,800*	*21.81*
4/13/44	25,900	19.16	*1/21/88*	*23,000*	*18.32*
3/8/45	39,800	26.00	*2/17/89*	*59,500*	*34.03*
2/16/46	28,700	20.28	*2/6/90*	*31,100*	*21.92*
1/5/47	25,600	18.75	*2/20/91*	*31,100*	*21.96*
4/16/48	47,800	30.65		Discontinued	
2/18/49	57,000	33.74			

Green River Lake placed in operation beginning February 1969 and Nolin River Lake placed in operation beginning March 1963.

TABLE 2 (Continued)

BARREN RIVER NEAR FINNEY, KY.

Drainage Area = 940 sq. mi. Gage Datum = 400.00 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
4/10/42	16,400	96.50	*2/4/74*	*4,980*	*87.98*
12/31/42	23,500	99.50	*4/6/75*	*6,360*	*90.24*
3/1/44	20,500	98.33	*2/4/76*	*5,080*	*88.11*
1/1/45	49,400		*3/2/77*	*8,160*	*88.20*
1/8/46	43,800		*12/14/77*	*4,590*	*88.01*
5/22/47	17,900	97.18	*1/30/79*	*7,150*	*91.00*
2/14/48	51,800		*2/7/80*	*5,220*	*87.75*
6/17/49	42,800		*6/19/81*	*3,250*	*87.10*
1/6/50	38,700		*3/9/82*	*3,950*	*92.95*
6/16/61	14,100	95.75	*5/24/83*	*4,380*	*86.98*
2/27/62	78,000		*12/11/83*	*5,000*	*87.86*
3/14/63	8,460	91.84	*11/18/84*	*4,030*	*86.77*
3/10/64	*7,410*	*90.68*	*2/27/86*	*3,560*	*85.61*
12/7/64	*5,440*	*88.20*	*12/11/86*	*4,540*	*87.21*
1/10/66	*4,590*	*86.98*	*1/27/88*	*3,990*	*86.50*
3/23/67	*6,080*	*89.20*	*4/12/89*	*5,130*	*87.75*
12/2/67	*3,420*	*85.69*	*2/10/90*	*4,890*	*87.20*
2/14/69	*3,690*	*85.70*	*3/22/91*	*5,340*	*87.83*
5/8/70	*4,140*	*86.97*	*1/7/92*	*4,170*	*86.18*
3/6/71	*4,300*	*87.11*	*2/23/93*	*3,290*	*84.86*
2/28/72	*6,060*	*89.18*	*4/11/94*	*7,470*	*90.66*
5/10/73	*4,860*	*87.85*		Discontinued	

Barren River Lake placed in operation beginning March 1964

TABLE 2 (Continued)

BARREN RIVER AT BOWLING GREEN, KY.

Drainage Area = 1,848 sq. mi. Gage Datum = 409.83 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1/8/13		52.20	*2/14/66*	*12,700*	*21.82*
1937		46.00	*3/7/67*	*22,700*	*29.61*
8/2/38	22,500	28.80	*4/5/68*	*29,000*	*33.65*
2/5/39	27,600	32.00	*6/24/69*	*59,000*	*41.67*
4/2/40	20,600	27.37	*12/30/69*	*23,300*	*29.37*
7/5/41	11,900	20.40	*8/4/71*	*11,400*	*20.56*
4/11/42	23,000	29.10	*1/29/72*	*19,400*	*26.24*
3/21/43	32,300	34.70	*12/10/72*	*19,600*	*29.37*
3/1/44	26,100	31.10	*1/11/74*	*29,900*	*29.37*
1/2/45	51,100	39.40	*3/13/75*	*62,400*	*29.37*
1/10/46	38,800	36.30	*3/30/76*	*22,500*	*28.76*
5/23/47	20,000	27.01	*3/5/77*	*18,400*	*25.73*
2/15/48	53,000	39.82	*12/6/77*	*17,500*	*25.50*
6/18/49	35,000	35.10	*12/9/78*	*48,900*	*39.47*
1/7/50	51,600	39.65	*12/14/79*	*19,400*	*26.57*
2/14/51	21,800	28.52	*6/7/81*	*21,400*	*27.76*
3/24/52	77,400	44.63	*2/10/82*	*14,000*	*23.69*
5/20/53	19,500	26.93	*5/20/83*	*42,000*	*37.04*
4/19/54	19,200	26.50	*5/8/84*	*41,400*	*37.15*
3/23/55	55,100	40.46	*11/19/84*	*16,300*	*24.38*
2/19/56	38,000	36.73	*2/18/86*		*20.91*
1/30/57	66,100	42.07	*3/1/87*	*20,400*	*28.12*
11/20/57	30,700	34.32	*1/20/88*	*17,600*	*26.14*
1/23/59	21,300	28.06	*2/22/89*	*35,400*	*34.02*
6/29/60	19,400	26.35	*2/4/90*	*28,000*	*31.34*
6/16/61	19,200	26.65	*12/23/90*	*23,900*	*30.86*
2/28/62	85,000	49.55	*12/3/91*	*24,200*	*29.64*
3/6/63	18,300	25.96	*2/22/93*	*8,290*	*16.12*
3/11/64	*24,000*	*30.04*	*4/12/94*	*32,300*	*33.24*
2/12/65	*20,200*	*26.88*		Discontinued	

Barren River Lake placed in operation beginning March 1964

TABLE 2 (Continued)

GREEN RIVER AT LOCK 4, WOODBURY, KY.

Drainage Area = 5,403 sq. mi. Gage Datum = 389.17 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1/11/13		38.50	*3/31/65*	*54,000*	*25.69*
1/25/37	205,000	43.10	*3/14/66*	*38,700*	*17.88*
8/2/38	39,900	20.20	*3/7/67*	*55,300*	*24.54*
2/6/39	66,200	29.30	*4/7/68*	*60,400*	*26.49*
4/22/40	44,600	21.60	*6/25/69*	*56,500*	*24.60*
7/19/41	22,500	13.12	*4/3/70*	*48,900*	*22.22*
4/12/42	48,700	23.05	*12/23/70*	*37,500*	*18.17*
3/23/43	73,700	30.16	*1/29/72*	*45,400*	*21.71*
3/3/44	46,800	21.54	*12/11/72*	*50,600*	*23.88*
1/4/45	74,100	29.30	*1/13/74*	*72,300*	*29.72*
1/12/46	53,000	24.79	*3/15/75*	*86,100*	*42.15*
1/5/47	45,800	21.88	*3/31/76*	*49,500*	*22.46*
2/17/48	87,400	31.30	*3/6/77*	*43,800*	*19.82*
2/18/49	72,700	30.65	*1/27/78*	*45,000*	
1/8/50	84,900	33.07	*12/11/78*	*102,000*	*34.07*
1/17/51	58,600	27.02	*12/15/79*	*45,300*	*21.19*
3/26/52	106,000	34.20	*6/8/81*	*44,800*	*20.71*
5/21/53	51,700	24.90	*1/24/82*	*40,900*	*19.00*
4/19/54	34,900	19.35	*5/21/83*	*70,700*	*29.62*
3/25/55	72,000	31.25	*5/9/84*	*101,000*	*34.15*
2/21/56	65,800	30.55	*11/20/84*	*39,000*	*27.74*
2/1/57	77,400	30.88	*2/19/86*	*36,000*	*25.68*
11/21/57	80,500	31.81	*3/2/87*	*51,700*	*33.38*
1/24/59	48,700	23.66	*1/22/88*	*49,500*	*30.25*
7/1/60	36,800	19.87	*2/17/89*	*92,300*	*42.95*
3/9/61	52,600	25.68	*2/5/90*	*53,400*	*33.72*
2/2/62	161,000	37.94	*12/20/90*	*51,900*	*34.66*
3/7/63	*41,300*	*21.35*	*12/4/91*	*45,600*	*31.20*
3/11/64	*69,800*	*30.15*		Discontinued	

Green River Lake placed in operation beginning February 1969, Nolin River Lake placed in operation beginning March 1963 and Barren River Lake placed in operation beginning March 1964.

TABLE 2 (Continued)

GREEN RIVER AT PARADISE, KY.

Drainage Area = 6,182 sq. mi. Gage Datum = 363.19 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
4/22/40	42,500		*4/2/76*	*46,000*	*26.16*
1/27/41	20,800		*3/7/77*	*38,200*	*23.86*
4/14/42	45,600		*1/29/78*	*44,000*	*24.96*
3/25/43	63,300		*12/13/78*	*75,700*	*36.01*
3/4/44	40,100		*12/16/79*	*39,700*	*25.94*
3/7/45	63,200		*6/9/81*	*40,100*	*23.62*
1/13/46	46,000		*12/6/91*	*39,700*	*22.81*
1/7/47	40,900		*3/5/93*	*25,500*	*17.02*
2/20/48	60,400		*3/14/94*	*46,800*	*28.14*
2/23/49	72,200		*5/23/95*	*48,800*	*30.15*
1/14/50	89,300		*3/9/96*	*31,600*	*20.86*
3/11/61	52,400	31.55	*3/7/97*	*86,300*	*37.63*
3/5/62	107,000	40.46	*6/12/98*	*39000*	*22.46*
3/8/63	*43,500*	*27.73*	*1/26/99*	*51200*	*26.92*
3/12/64	*65,400*	*55.67*	*2/19/00*	*29400*	*17.85*
4/1/65	*58,100*	*30.18*	*2/18/01*	*34200*	*19.62*
2/15/66	*38,900*	*24.23*	*3/23/02*	*44600*	*25.04*
3/11/67	*52,700*	*28.59*	*2/21/03*	*42700*	
4/9/68	*56,700*	*30.27*	*2/9/04*	*41400*	*22.25*
6/27/69	*53,400*	*28.11*	*9/1/05*	*40800*	*21.11*
4/5/70	*43,400*	*26.38*	*1/26/06*	*35600*	*19.85*
2/24/71	*41,100*	*25.88*	*1/9/07*	*33500*	*18.6*
2/27/72	*46,300*	*27.73*	*4/7/08*	*50100*	*27.78*
12/12/72	*46,200*	*28.30*	*2/1/09*	*47800*	*24.21*
1/14/74	*59,300*	*31.88*	*5/8/2010*	*61600*	*35.01*
3/17/75	*65,700*	*33.66*	*4/30/2011*	*54800*	*31.12*

Green River Lake placed in operation beginning February 1969, Nolin River Lake placed in operation beginning March 1963 and Barren River Lake placed in operation beginning March 1964.

TABLE 2 (Continued)

ROUGH RIVER AT FALLS OF ROUGH, KY.

Drainage Area = 504 sq. mi. Gage Datum = 420.94 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1/12/13		28.96	*2/22/71*	*4,750*	*21.84*
3/29/05		28.93	*2/24/72*	*4,770*	*21.87*
03/00/35		29.31	*12/8/72*	*4,100*	*20.48*
1/25/37		34.06	*1/11/74*	*3,480*	*18.42*
2/16/49	11,400	28.20	*3/29/75*	*4,020*	*20.20*
1/14/50	12,400	28.87	*1/26/76*	*3,080*	*16.84*
1/16/51	10,900	27.85	*3/4/77*	*3,280*	*17.62*
3/23/52	11,600	28.32	*12/5/77*	*5,400*	*22.76*
3/5/53	8,060	25.95	*12/4/78*	*5,440*	*22.82*
4/16/54	3,000	17.06	*1/30/80*	*3,740*	*19.24*
3/23/55	7,140	25.08	*5/19/81*	*3,770*	*19.34*
2/4/56	8,840	26.49	*2/9/82*	*3,360*	*17.91*
5/24/57	10,500	27.59	*5/3/83*	*6,000*	*23.01*
11/19/57	4,900	24.38	*5/7/84*	*5,850*	*23.47*
1/21/59	6,620	24.52	*12/21/84*	*4,040*	*20.19*
1/15/60	*4,130*	*20.38*	*2/2/86*	*3,100*	*16.92*
5/8/61	*5,130*	*21.44*	*2/28/87*	*2,840*	*15.90*
2/27/62	*3,230*	*16.78*	*1/20/88*	*5,250*	*22.52*
3/5/63	*4,170*	*19.67*	*2/14/89*	*6,150*	*23.92*
3/9/64	*8,320*	*26.13*	*2/16/90*	*7,890*	*25.64*
12/11/64	*2,730*	*15.59*	*12/18/90*	*5,030*	*21.47*
2/10/66	*3,660*	*18.20*	*3/19/92*	*3,470*	*17.42*
5/14/67	*5,620*	*22.69*	*5/4/93*	*3,310*	*17.03*
4/4/68	*4,160*	*18.84*	*2/4/94*	*2,800*	*15.00*
4/18/69	*3,910*	*18.35*		Discontinued	
4/2/70	*4,020*	*20.45*			

Rough River Lake placed in operation beginning October 1959.

TABLE 2 (Continued)

GREEN RIVER AT LOCK 2, CALHOUN, KY.

Drainage Area = 7,564 sq. mi. Gage Datum = 353.95 (NGVD)

Date	Discharge in CFS	Stage in Feet	Date	Discharge in CFS	Stage in Feet
1913		36.8	*2/24/71*	*41,000*	*26.30*
4/27/31	28,100	15.4	*3/1/72*	*45,000*	*27.87*
2/6/32	80,000	32.2	*12/14/72*	*45,700*	*28.30*
1/30/33	59,100	29.4	*1/18/74*	*54,500*	*30.01*
3/10/34	51,100	27.1	*3/20/75*	*58,700*	*31.14*
4/7/35	73,300	32.9	*4/2/76*	*46,300*	*27.57*
4/15/36	53,000	30.1	*3/7/77*	*40,800*	*22.97*
1/27/37	208,000	43.7	*1/30/78*	*42,600*	*25.37*
8/4/38	44,500	25.1	*12/15/78*	*73,800*	*32.47*
2/11/39	72,900	32.9	*12/17/79*	*43,800*	*26.36*
4/25/40	49,300	29.2	*6/11/81*	*40,000*	*23.05*
1/27/41	23,600	14.1	*1/26/82*	*40,000*	*23.55*
4/15/42	46,400	27.3	*5/5/83*	*62,000*	*31.48*
3/27/43	67,600	32.3	*5/14/84*	*78,200*	*32.40*
4/17/44	40,100	25.6	*12/22/84*	*43,600*	
3/8/45	70,900	33.6	*2/21/86*	*32,800*	*20.01*
2/19/46	51,700	29.2	*3/4/87*	*44,300*	*23.99*
1/8/47	41,200	24.3	*1/24/88*	*48,000*	*22.87*
2/22/48	57,000	30.3	*2/21/89*	*80,000*	*33.37*
2/24/49	71,300	32.3	*2/15/90*	*51,500*	*29.42*
1/16/50	86,300	36.3	*12/26/90*	*50,900*	*29.84*
1/21/51	63,400	32.0	*12/6/91*	*40,500*	*20.56*
3/31/52	72,000	32.5	*3/5/93*	*32,000*	*19.31*
5/26/53	48,000	28.5	*3/15/94*	*45,300*	*27.54*
4/21/54	36,900	20.4	*5/23/95*	*53,400*	*29.66*
3/29/55	66,800	32.2	*3/9/96*	*38,500*	*24.00*
2/25/56	67,000	32.6	*3/7/97*	*86,000*	*34.37*
2/8/57	54,600	30.7	*4/21/98*	*44200*	*23.91*
11/27/57	59,600	31.1	*1/27/99*	*49300*	*27.47*
1/27/59	42,200	28.2	*2/21/00*	*31900*	*21.83*
7/3/60	*41,400*	*22.65*	*2/19/01*	*38000*	*19.43*
3/12/61	*52,700*	*30.52*	*3/23/02*	*47800*	*27.01*
2/8/62	*106,000*	*33.97*	*2/24/03*	*48500*	*27.93*
3/18/63	*42,600*	*28.93*	*2/9/04*	*40700*	*22.16*
3/13/64	*80,300*	*33.96*	*12/11/04*	*41100*	*20.91*
4/3/65	*47,800*	*28.87*	*1/26/06*	*37200*	*20.43*
2/15/66	*39,700*	*25.23*	*1/10/07*	*35100*	*22.19*
3/13/67	*44,900*	*28.81*	*4/8/08*	*53000*	*28.56*
4/11/68	*50,000*	*28.25*	*2/2/09*	*45700*	*24.51*
6/27/69	*46,900*	*24.09*	*5/9/10*	*70400*	*31.46*
4/6/70	*42,100*	*26.63*	*5/4/11*	*76900*	*34.04*

Green River Lake placed in operation beginning February 1969, Nolin River Lake placed in operation beginning March 1963, Barren River Lake placed in operation beginning March 1964 and Rough River Lake placed in operation beginning October 1959.

Climate Data

The National Oceanic and Atmospheric Administration Weather Service (NOAA) maintains year round surveillance of weather conditions for the study area at its various climate collection stations. Flood warning and anticipated weather conditions are issued to city / county officials, radio / television stations and the local press for further dissemination to the residents of the area.

Similar to the USGS stream gaging program, funding is limited and some climate stations have been discontinued in recent years. However, new technology such as NEXRAD radar provides rainfall information for the predicting of anticipated flooding, but the historic preservation of this information is still in the developmental stage.

The NOAA climate stations at Bowling Green, Ky. and Henderson, Ky. are near the study extremes and were selected as being representative of the study reach. The following temperature and precipitation data was extracted from the Midwestern Climate Center Internet web site.

a. Recorded Temperature Data

The climate within the study area varies with moderately warm summers and cool winters with an average temperature of about 36 degrees Fahrenheit in the winter and 76 degrees Fahrenheit in the summer.

Bowling Green, Kentucky (Averages: 1961-1990 Extremes: 1893-1996)

	Averages			Daily Extremes				Mean Extremes			
	Max	Min	Mean	High	Date	Low	Date	High	Year	Low	Year
Annual	67.5	46.0	56.8	113	7/28/30	-21	1/23/63	62.7	1921	55.0	1958
Winter	45.4	26.4	36.0	83	2/28/18	-21	1/23/63	47.7	1932	28.3	1978
Spring	68.0	45.4	56.7	100	5/28/11	-6	3/5/60	62.9	1921	51.5	1960
Summer	87.1	65.1	76.1	113	7/28/30	39	6/13/03	82.4	1936	73.0	1967
Fall	69.6	47.0	58.3	105	9/7/25	-7	11/25/50	66.7	1931	52.9	1976

Henderson, Kentucky (Averages: 1961-1990 Extremes: 1896-1996)

	Averages			Daily Extremes				Mean Extremes			
	Max	Min	Mean	High	Date	Low	Date	High	Year	Low	Year
Annual	67.3	46.4	56.9	113	7/13/36	-20	1/19/94	67.0	1931	55.0	1947
Winter	44.1	26.3	35.2	80	2/13/62	-20	1/19/94	45.4	1932	26.7	1936
Spring	68.0	46.2	57.1	97	5/31/34	-4	3/6/60	61.7	1977	51.7	1960
Summer	87.2	65.1	76.2	113	7/13/36	41	6/2/56	84.1	1936	72.7	1946
Fall	69.9	48.0	59.0	104	9/8/39	-5	11/25/50	65.3	1931	53.5	1976

b. Recorded Precipitation Data

The rainfall within the study area is generally evenly distributed throughout the year with extremes, maximum or minimums, occurring during any season of any given year.

Bowling Green, Kentucky (Averages: 1961-1990 Extremes: 1893-1996)

	Total Precipitation							Snow		
	Mean	High	Year	Low	Year	1-Day Max	Date	Mean	High	Year
Annual	50.93	76.56	1979	30.50	1930	11.02	4/29/37	12.8	49.8	1960
Winter	12.98	30.12	1950	5.45	1963	6.15	12/7/24	11.0	34.7	1978
Spring	14.36	25.58	1983	5.87	1900	11.02	4/29/37	1.4	32.0	1960
Summer	12.42	19.56	1938	5.22	1952	5.69	6/23/69	0.0	0.0	-
Fall	11.17	22.39	1921	2.82	1963	6.02	9/13/79	0.4	8.0	1966

Henderson, Kentucky (Averages: 1961-1990 Extremes: 1896-1996)

	Total Precipitation							Snow		
	Mean	High	Year	Low	Year	1-Day Max	Date	Mean	High	Year
Annual	44.80	71.01	1950	28.25	1963	6.33	3/11/35	15.9	39.5	1978
Winter	9.80	28.22	1950	3.68	1977	4.28	12/30/32	12.4	35.5	1985
Spring	13.62	27.27	1983	4.61	1941	6.33	3/11/35	2.8	21.5	1960
Summer	11.05	19.00	1950	2.13	1936	5.02	7/10/65	0.0	0.0	-
Fall	10.33	22.43	1984	2.47	1963	4.72	9/24/84	0.7	8.5	1958

Hydrologic and Hydraulic Analysis

This report will provide current modified (indicating the benefits of the upstream COE lake operation) flood frequency and flow duration profiles for the Green River and Barren River study reach from which water surface elevations could be used as the basis of further analysis. To develop water surface profiles two main elements are required. Frequency or duration discharge values must be developed and the stream physical geometry must be established to which the flow values will be applied.

a. Development of Flood Frequency Discharges.

Natural peak discharge-frequency values for the Green River and Barren River were developed from period of record data for gaged locations on the respective streams. Data modified by operational periods for Green, Nolin, Barren, and Rough River Lakes were returned to natural conditions and included in the natural data analyses.

Final existing condition (modified) discharge-frequency curves were developed through paper operation, October, 1939 through September, 1980 for the four lake projects. Resultant lake holdouts (developed from 12-hour storage differences in each lake) were routed through each gage location to determine the modified peak discharge events. The final modified discharge-frequency values for the Green River and Barren River study reach were based on the "paper operation" period and actual lake operation period. Pertinent discharge values were selected from the relationship developed using these gages. Determination of the final frequency-

discharge relationships were made using Bulletin No. 17B criterion and considered omission of low and high outliers, weighting with a generalized skew, and historically adjusting the data where possible.

The flood frequency discharges for the USGS gages located at Paradise, Munfordville, Calhoun, and Kyrock, Kentucky were updated from the original report to include the latest available annual peak flow data from USGS. As all of the other gages in the study area were discontinued prior to 1997, they did not require an update. While the inclusion of these extra data points did alter the flood frequency discharges at all four gages, none were changed by more than 5%. Because of this, it was determined that an update of the hydraulic analysis using these discharges was not necessary, as significant changes to water surface elevations would not be expected. By the same logic, stage frequency curves would not be expected to change drastically and were not updated. The natural and modified discharge and stage frequency curves, and the record upon which they were based, are shown on Plates 6 through 21 for the USGS gaging stations within the study reach.

b. Surveyed Cross-Sections and Mapping

Surveyed natural cross-sections were obtained at uniform intervals from top of bank to top of bank; bridge geometry was field surveyed. Overbank areas were added to the surveyed data and additional cross-sections estimated using the best available mapping.

The best available mapping for the study area is USGS quadrangle sheets having a scale of 1"=2000' with 10-foot or 20-foot contour intervals. This large scale and contour interval together with estimated stream geometry below the map water surface, in some locations, limits the degree of accuracy presented as the final product.

c. Hydraulic Analyses

Analyses of the hydraulic characteristics for the streams studied were carried out to provide estimates of the water surface elevations of selected recurrence intervals.

Roughness coefficients (Manning's n) were developed from field inspection and known roughness values for comparable streams in adjacent watersheds. In addition, 1950, 1962, and 1974 flood highwater marks were reproduced in order to verify the roughness values for the Green River. Similarly, the 1957 flood highwater marks were used for Barren River. The present study used roughness coefficients ranging from 0.030-0.065 for the channel and 0.055-0.085 for overbanks (Green River) and 0.035-0.048 for the channel and 0.050-0.075 for overbanks (Barren River).

Water surface profiles of selected discharge magnitude, existing conditions and with various dams removed, were computed using the HEC-2 step-backwater computer program. The starting water surface elevations were computed by the slope/area method. Profiles were drawn showing the computed water surface elevations of the selected discharge values and are presented on Plates 22 through 30. The hydraulic analyses for this study are based on unobstructed flow. The water surface elevations shown on the profiles are thus considered valid

only if hydraulic structures remain unobstructed, operate properly, and do not fail. All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

During floods, debris collecting on bridges could decrease their carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing selected water surface profiles. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges and culverts, but do not reflect increased water surface elevation that could be caused by debris collection against the structures, or by deposition of silt in the stream channel under structures. None of the bridges in the study area are significantly restrictive to flows of the flows studied. However, the approaches to most of these bridges are at a low elevation and subject to flooding and therefore impassable. The Green River or the Barren River lock and dam structures have little or no effect on larger flood water surface profiles.

Water velocities during floods depend largely on the size and shape of the cross sections, conditions of the stream, and the bed slope, all of which vary on different streams and at different locations on the same stream.

d. Discharge / Elevation Duration

Flow duration is a measure of the range and variability of stream flows. Usually presented as a graph of volume flow rate (discharge in cubic feet pre second) versus percent of time that flows are greater than, or equal to, a selected flow during the period of record studied.

Duration curves were developed for the USGS gaging stations Green River at Munfordville, Brownsville at Lock 6, Woodbury at Lock 4, Calhoun at Lock 4, Nolin River at Kyrock and Barren River at Bowling Green. The period of record, modified by Green River, Barren River, Nolin River and Rough River Lakes, for each site was analyzed. Each mean daily discharge value was placed in ascending order, individual number of occurrences tabulated, then the percent of occurrence versus total days in the period of record was computed. Flow duration values for Green River Lock 6 were translated upstream to the Mammoth Cave gaging station and downstream from Bowling Green to the Barren River Lock 1 site by the drainage-area relationship method. Table 3 presents annual discharge duration values for the published USGS gaging stations within the study area.

TABLE 3

DISCHARGE DURATION
(IN CUBIC FEET PER SECOND)

ANNUAL

Gaging Station	Period of Record	Drainage Area (sq. mi.)	100 %	90 %	70 %	50 %	25 %	10 %	5 %	1 %
Munfordville	1970-1990	1,673	157	300	695	1,550	4,430	7,120	9,010	18,500
Kyrock	1964-1990	707	0*	43*	233	470	1,170	2,660	4,540	7,770
Brownsville	1964-1990	2,762	190	589	1,240	2,290	6,400	12,400	15,500	25,300
Bowling Green	1965-1990	1,849	75	288	719	1,990	4,310	6,040	7,100	12,500
Woodbury	1964-1990	5,404	356	1,130	2,580	5,200	12,800	22,600	29,200	48,200
Calhoun	1962-1990	7,566	455	1,390	3,250	6,490	16,700	31,100	39,400	52,500

TABLE 3 (Continued)

AUGUST

Gaging Station	Period of Record	Drainage Area (sq. mi.)	99 %	90 %	70 %	50 %	25 %	10 %	5 %	1 %
Munfordville	1970-1990	1,673	167	235	299	421	729	3,070	4,590	7,190
Kyrock	1964-1990	707	0*	12*	95	181	317	596	863	2,690
Brownsville	1964-1990	2,762	195	389	545	726	1,350	3,340	6,140	12,500
Bowling Green	1965-1990	1,849	93	163	242	410	978	3,110	3,800	5,550
Woodbury	1964-1990	5,404	360	719	1,040	1,500	3,070	6,320	8,980	21,600
Calhoun	1962-1990	7,566	449	850	1,200	1,880	3,810	6,880	10,900	21,500

(*) Minimum design outflow from Nolin River Lake is 50 cfs. However, special maintenance operations have required short periods of zero outflow and are reflected in these discharge duration computations.

Best-fit discharge versus water surface elevation rating curves were developed from USGS rating curves and/or the HEC-2 computer model for the Green River Lock 6, Mammoth Cave (at mile 197) and Nolin River at Kyrock sites. Estimated, existing condition and with Dam 6 removed, discharge versus water surface elevation rating curves are presented on Plates 31 through 33. Estimated flow duration water surface elevation profiles, existing condition and with various lock and dams in place and/or removed, are presented on Plates 23 through 30.

Annual elevation duration curves, (percent of time a selected water surface elevation is equaled or exceeded versus the selected water surface elevation) for the Green River Lock 6, Mammoth Cave (at mile 197) and Nolin River at Kyrock sites, are presented on Plates 34 through 36. Existing condition curves and with Green River dam 6 removed curves are shown on each Plate. In addition, discharge duration curves based on annual and August flows, are furnished for each published gaging station within the study reach on Plates 37 through 42.

Table 4 presents representative elevation duration values that can be derived from the Green River at Mammoth Cave duration curve.

TABLE 4

GREEN RIVER AT MAMMOTH CAVE - MILE 197

ELEVATION DURATION DATA

Percent of Time an Elevation is Equaled or Exceeded	Estimated Water Surface Elevation in Feet (NGVD) Existing Condition	Dam 6 Removed
100 %	421.4	417.1
90 %	422.3	418.9
80 %	423.0	420.2
70 %	423.9	421.6
60 %	425.1	423.1
50 %	426.7	425.2
40 %	429.1	427.9
30 %	432.8	432.0
20 %	436.3	435.7
10 %	440.4	440.1

e. Elevation Hydrographs

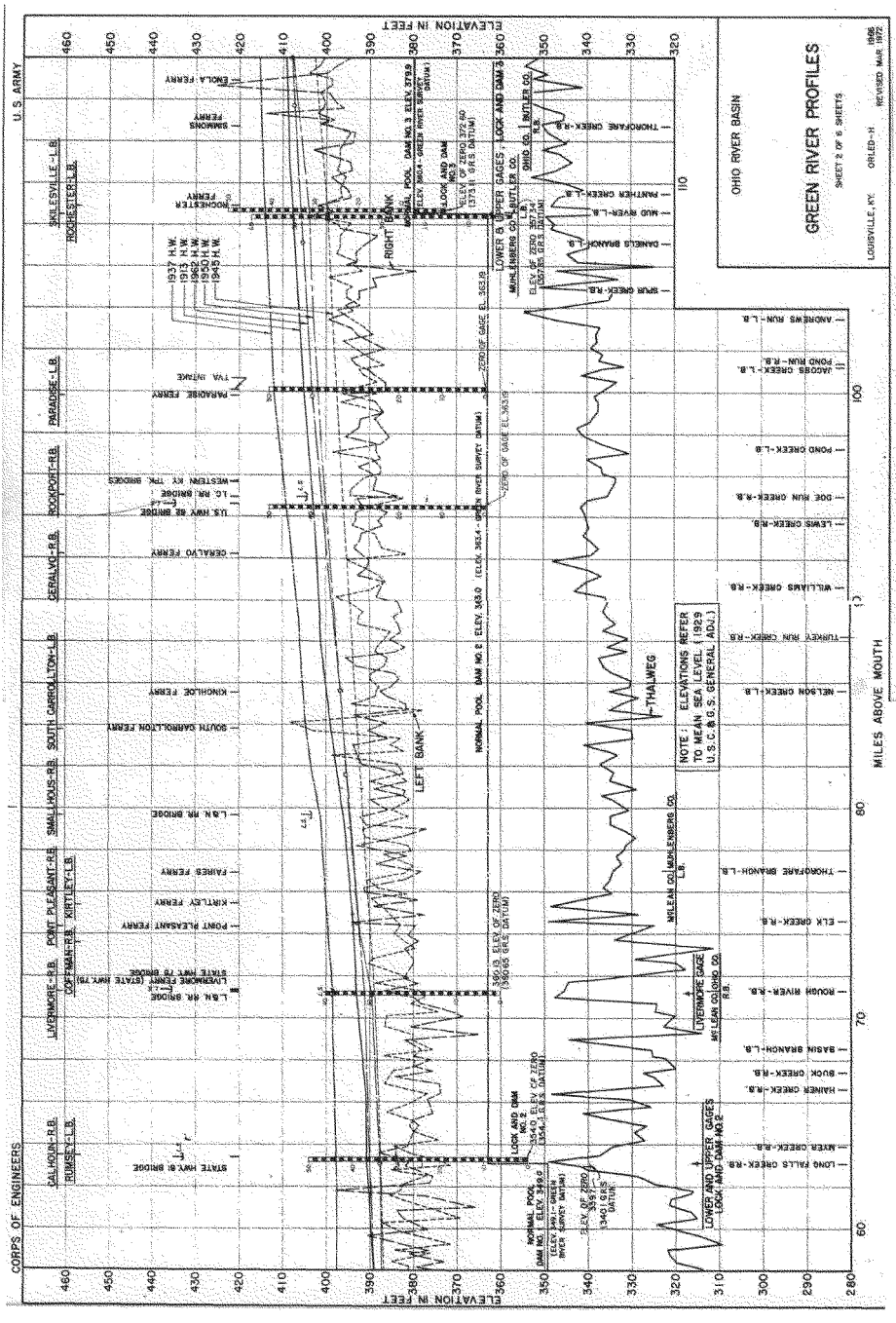
Elevation hydrographs, water surface elevation versus time, were developed from observed mean daily discharge values applied to the adopted elevation versus discharge rating curves (Plates 31 and 33). The selected presentation includes data from the Green River at Brownsville and Nolin River at Kyrock USGS gages. These data include existing conditions and the Dam 6 removed scenario. Brownsville data is shown on Plates 43 through 48 and Kyrock data on Plates 49 through 55.

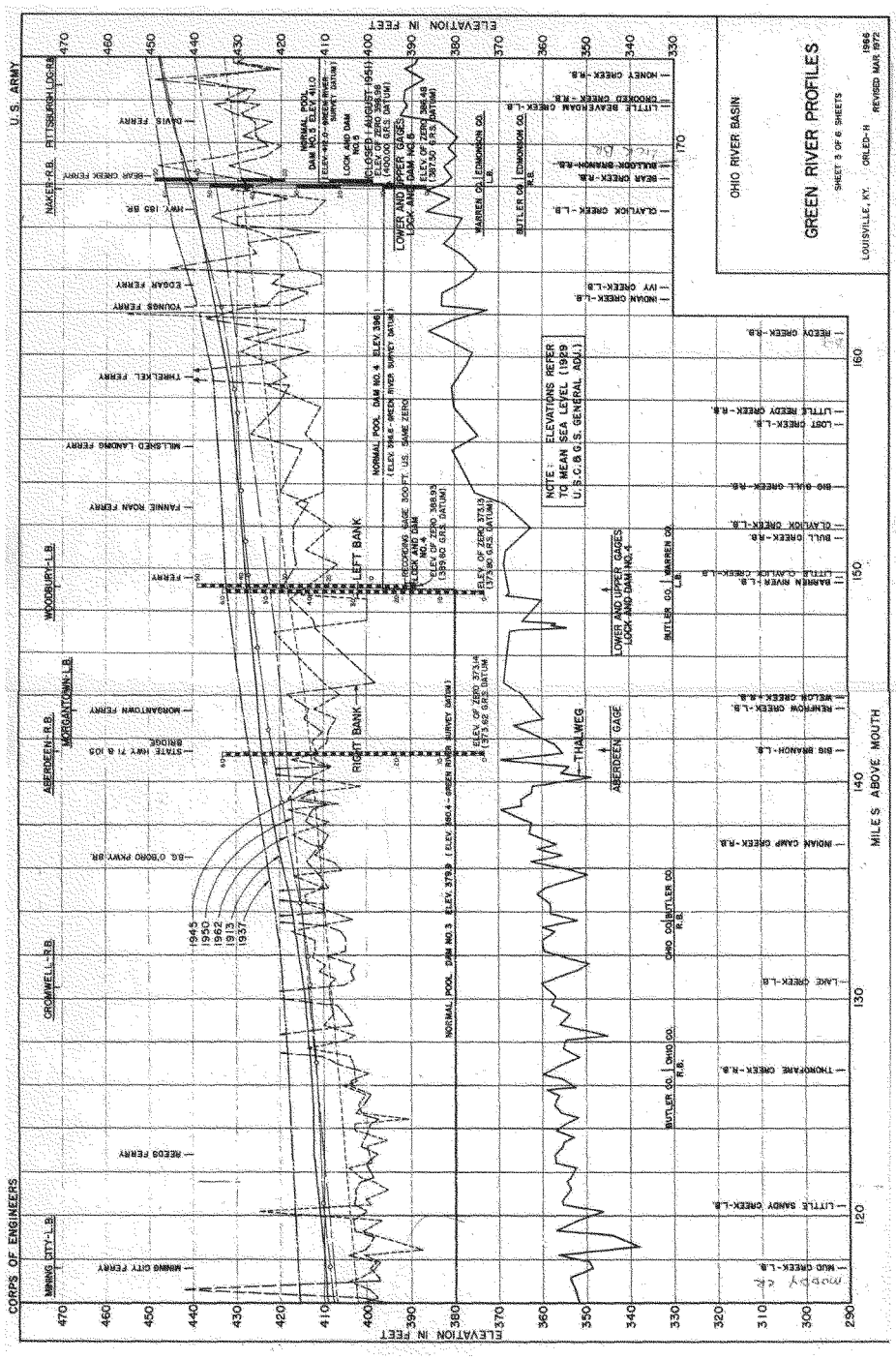
Nolin River Lake Tailwater

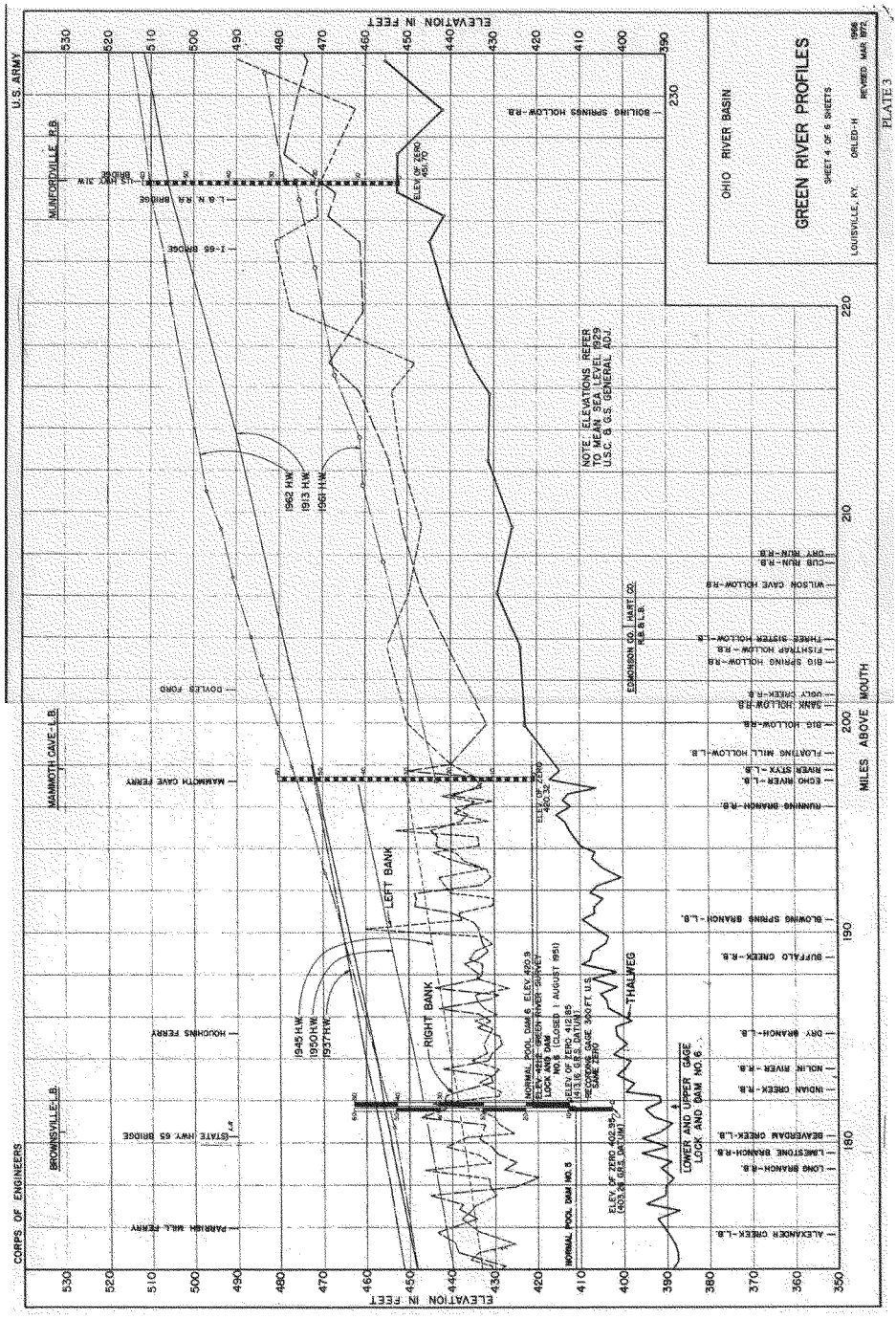
Examination of elevation hydrographs, Plates 49 through 55, for the Nolin River Lake tailwater (Nolin River at Kyrock) revealed that there were possibly nine occurrences in 25 years (1969 through 1993) when the increase in tailwater velocities, at the beginning of a Nolin Lake release, would be more severe with Dam 6 removed than under existing conditions. During these occurrences, the tailwater elevation may increase by 13 feet in one day, compared to 7 feet under existing lake operation and river conditions. This change in tailwater fluctuations would cause a temporary increase in velocities, increasing the tendency for stream bank failures in the stream reach immediately downstream of Nolin Dam. This tendency could be reduced by a lengthened time that Nolin Lake releases are increased from minimum release to bank-full.

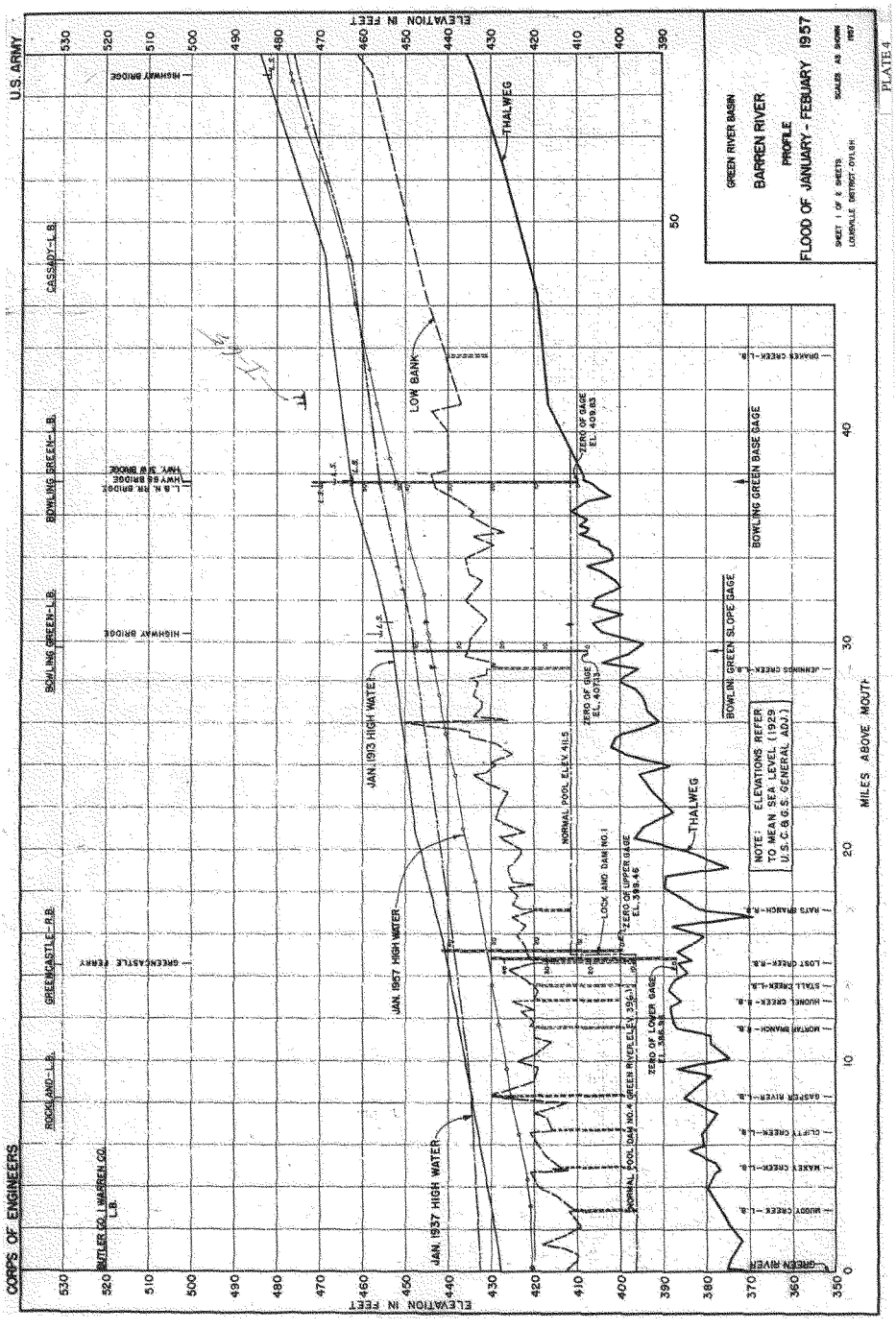
No modification of the stilling basin would be required because it was designed to meet maximum release requirements when backwater from Lock and Dam 6 was not a factor. Since the tailwater area has already been protected with grouted rip-rap, significant bank caving is unlikely.

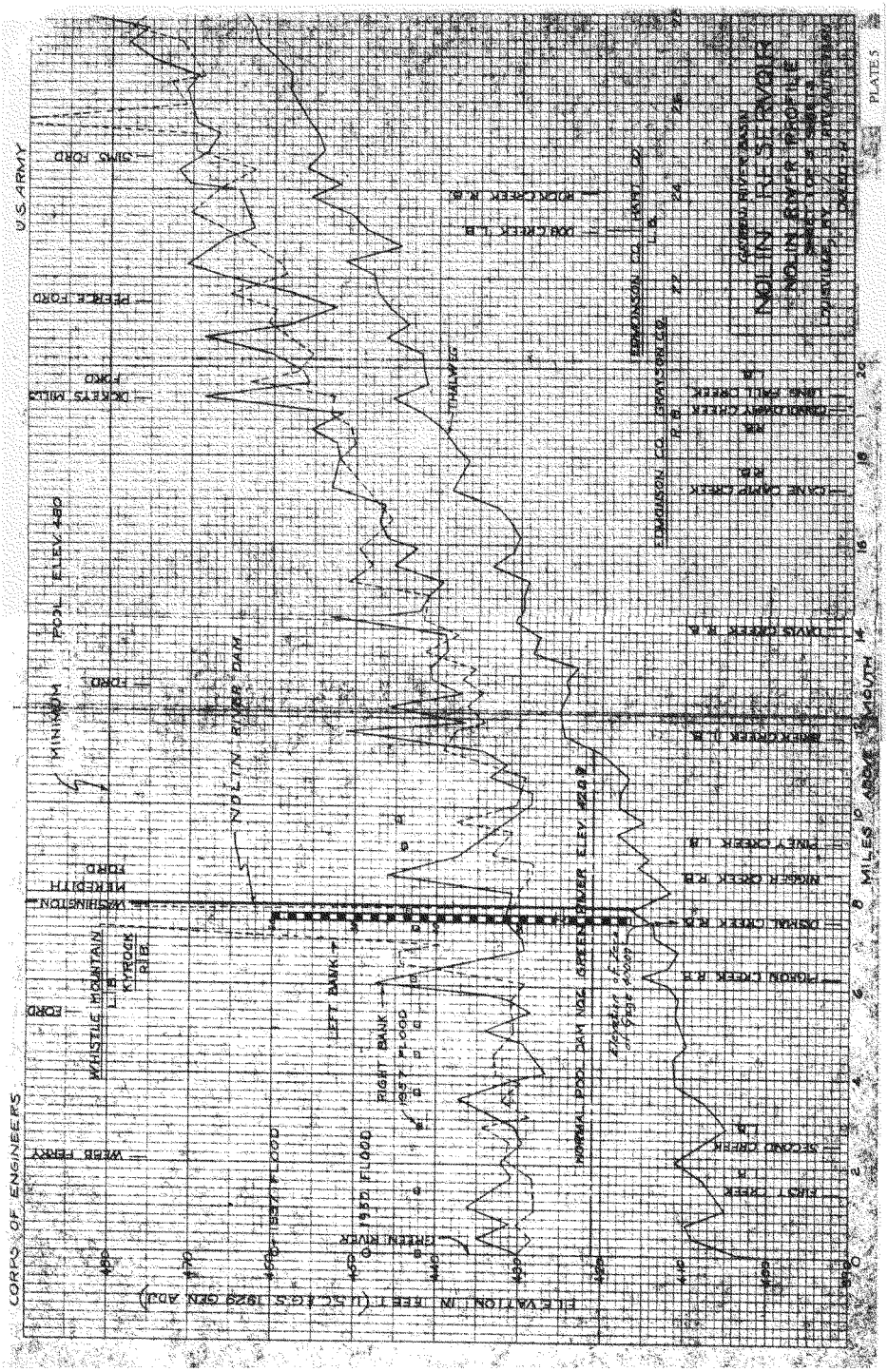
Examination of elevation hydrographs for Green River at Brownsville (Lock and Dam 6), Plates 43 through 48 revealed that there were possibly three occurrences in 23 years (1969 through 1991) when drawdown after a flood release from Nolin River Lake would be more severe with Dam 6 removed. However, these occurrences could also be alleviated by avoiding sudden reductions in Nolin River Lake releases. Possible bank caving would be too rare to estimate cost of repair on an annual basis.


CORPS OF ENGINEERS
U. S. ARMY
OHIO RIVER BASIN
GREEN RIVER PROFILES
SHEET 2 OF 6 SHEETS
LOUISVILLE, KY.
ORLED-H
REVISED MAR. 1972
PLATE 1
ELEVATION IN FEET
MILES ABOVE MOUTH
NOTE: ELEVATIONS REFER TO MEAN SEA LEVEL (1929 U.S.C.&G.S. GENERAL ADJ.)
LEFT BANK
RIGHT BANK
THALWEG
CALHOUN-R.B.
RUMSEY-L.B.
LIVERMORE-R.B.
COFFMAN-R.B.
POINT PLEASANT-R.B.
KIRTLEY-L.B.
SMALLHOUSE-R.B.
SOUTH CARROLLTON-L.B.
CERALVO-R.B.
ROCKPORT-R.B.
PARADISE-L.B.
SKILESVILLE-L.B.
ROCHESTER-L.B.
LOWER AND UPPER GAGES LOCK AND DAM NO. 2
LOWER & UPPER GAGES, LOCK AND DAM 3
LOCK AND DAM NO. 2
LOCK AND DAM NO. 3
NORMAL POOL DAM NO. 2 ELEV. 363.0
NORMAL POOL DAM NO. 3 ELEV. 379.9
ZERO OF GAGE EL. 363.19
ZERO OF GAGE EL. 363.19
LIVERMORE GAGE
McLEAN CO. OHIO CO.
McLEAN CO. MUHLENBERG CO.
MUHLENBERG CO. BUTLER CO.
OHIO CO. BUTLER CO.
ENOLA FERRY
SIMMONS FERRY
ROCHESTER FERRY
PARADISE FERRY
TVA INTAKE
WESTERN KY. TPK. BRIDGES
L.C. RR. BRIDGE
U.S. HWY 62 BRIDGE
CERALVO FERRY
KINCHLOE FERRY
SOUTH CARROLLTON FERRY
L.&N. RR. BRIDGE
FAIRES FERRY
KIRTLEY FERRY
POINT PLEASANT FERRY
STATE HWY. 79 BRIDGE
L.&N. RR. BRIDGE
STATE HWY. 81 BRIDGE
ANDREWS RUN-L.B.
JACOBS CREEK-L.B.
POND RUN-R.B.
POND CREEK-L.B.
DOE RUN CREEK-R.B.
LEWIS CREEK-R.B.
WILLIAMS CREEK-R.B.
TURKEY RUN CREEK-R.B.
NELSON CREEK-L.B.
THORCFARE BRANCH-L.B.
ELK CREEK-R.B.
ROUGH RIVER-R.B.
BASIN BRANCH-L.B.
BUCK CREEK-R.B.
HAINER CREEK-R.B.
MYER CREEK-R.B.
LONG FALLS CREEK-R.B.
THORCFARE CREEK-R.B.
PANTHER CREEK-L.B.
MUD RIVER-L.B.
DANIELS BRANCH-L.B.
SPUR CREEK-R.B.
1937 H.W.
1913 H.W.
1962 H.W.
1950 H.W.
1945 H.W.


U.S. ARMY
CORPS OF ENGINEERS
OHIO RIVER BASIN
GREEN RIVER PROFILES
SHEET 3 OF 6 SHEETS
LOUISVILLE, KY. ORLED-H REVISED MAR 1972
1986
PLATE 7
ELEVATION IN FEET
MILES ABOVE MOUTH
THALWEG
LEFT BANK
RIGHT BANK
NOTE: ELEVATIONS REFER TO MEAN SEA LEVEL (1929 U.S.C.&G.S. GENERAL ADJ.)
1945
1950
1962
1913
1937


U.S. ARMY
CORPS OF ENGINEERS
OHIO RIVER BASIN
GREEN RIVER PROFILES
SHEET 4 OF 6 SHEETS
LOUISVILLE, KY.
DRAWN-H
REVISED MAR. 1972
PLATE 3
ELEVATION IN FEET
MILES ABOVE MOUTH
MUNFORDVILLE, R.B.
MAMMOTH CAVE, L.B.
BROWNSVILLE, L.B.
L. & N. R.R. BRIDGE
I-65 BRIDGE
MAMMOTH CAVE FERRY
DOYLES FORD
HOUCHINS FERRY
STATE HWY. 65 BRIDGE
PARRISH MILL FERRY
1962 H.W.
1913 H.W.
1961 H.W.
1945 H.W.
1950 H.W.
1937 H.W.
NOTE: ELEVATIONS REFER TO MEAN SEA LEVEL 1929 U.S.C. & G.S. GENERAL ADJ.
EDMONSON CO. | HART CO.
KY. & T.R.
LEFT BANK
RIGHT BANK
THALWEG
NORMAL POOL DAM 6 ELEV. 429.9
ELEV. 1938 GREEN RIVER SURVEY
LOCK NO. 6 (CLOSED 1 AUGUST 1951)
ELEV OF ZERO 412.85
(413.16 G.R.S. DATUM)
ELEV. OF ZERO 402.39
(403.98 G.R.S. DATUM)
NORMAL POOL DAM NO. 5
LOWER AND UPPER GAGE
LOCK AND DAM NO. 6
ELEV OF ZERO 400.19
ELEV. OF ZERO 402.39
WILSON CAVE HOLLOW-R.B.
CUB RUN-R.B.
DRY RUN-R.B.
BIG SPRING HOLLOW-R.B.
FISHTRAP HOLLOW-R.B.
THREE SISTER HOLLOW-L.B.
DOLLY CREEK-R.B.
SANK HOLLOW-R.B.
BIG HOLLOW-R.B.
FLOATING MILL HOLLOW-L.B.
NIVEN STYX-L.B.
ECHO RIVER-L.B.
RUNNING BRANCH-R.B.
BLOWING SPRING BRANCH-L.B.
BUFFALO CREEK-R.B.
DRY BRANCH-L.B.
NOLIN RIVER-R.B.
INDIAN CREEK-R.B.
BEAVERDAM CREEK-L.B.
LIMESTONE BRANCH-R.B.
LONG BRANCH-R.B.
ALEXANDER CREEK-L.B.
BOILING SPRINGS HOLLOW-R.B.


U.S. ARMY
CORPS OF ENGINEERS
GREEN RIVER BASIN
BARREN RIVER
PROFILE
FLOOD OF JANUARY - FEBRUARY 1957
PLATE 4
ELEVATION IN FEET
MILES ABOVE MOUTH
JAN. 1937 HIGH WATER
JAN. 1957 HIGH WATER
JAN. 1913 HIGH WATER
LOW BANK
THALWEG
NORMAL POOL ELEV. 410.5
NORMAL POOL DAM NO. 4 GREEN RIVER ELEV. 359.1
LOCK AND DAM NO. 1
ZERO OF GAGE EL. 409.83
ZERO OF GAGE EL. 407.93
ZERO OF UPPER GAGE EL. 393.45
ZERO OF LOWER GAGE EL. 386.58
BOWLING GREEN SLOPE GAGE
BOWLING GREEN BASE GAGE
NOTE: ELEVATIONS REFER TO MEAN SEA LEVEL (1929 U.S.C.&G.S. GENERAL ADJ.)
ROCKLAND - L.B.
GREENCASTLE - R.B.
BOWLING GREEN - L.B.
BOWLING GREEN - L.B.
CASSIDY - L.B.
BUTLER CO. WARREN CO. L.B.
HIGHWAY BRIDGE
GREENCASTLE FERRY
L. & N. RR BRIDGE
HWY. 68 BRIDGE
HWY. 31W BRIDGE
GREEN RIVER
MUDDY CREEK - L.B.
MARKET CREEK - L.B.
CLIFTY CREEK - L.B.
BARREN RIVER - L.B.
MOUTH BRANCH - R.B.
HUDNEL CREEK - R.B.
SMALL CREEK - L.B.
LOST CREEK - R.B.
MATS BRANCH - R.B.
JENNINGS CREEK - L.B.
DRAKES CREEK - L.B.


CORPS OF ENGINEERS
U.S. ARMY
GREEN RIVER BASIN
NOLIN RESERVOIR
NOLIN RIVER PROFILE
PLATE 5
ELEVATION IN FEET (U.S.C.&G.S. 1929 GEN. ADJ.)
MILES ABOVE MOUTH
WEBB FERRY
FORD
WHISTLE MOUNTAIN L.B.
KYROCK R.B.
WASHINGTON
MEREDITH FORD
MINIMUM POOL ELEV. 480
NOLIN RIVER DAM
DICKEYS MILLS FORD
PEERCE FORD
SIMS FORD
GREEN RIVER
1937 FLOOD
1950 FLOOD
LEFT BANK
RIGHT BANK
1957 FLOOD
NORMAL POOL DAM NO. 2 GREEN RIVER ELEV. 420.0
Elevation of Zero of Gage 400.00
FIRST CREEK L.B.
SECOND CREEK L.B.
PIGEON CREEK R.B.
DISMAL CREEK R.B.
NIGGER CREEK R.B.
PINEY CREEK L.B.
BRIER CREEK L.B.
DAVIS CREEK R.B.
CANE CAMP CREEK R.B.
DUNDOMMY CREEK R.B.
LONG FALL CREEK L.B.
EDMONSON CO. GRAYSON CO. R.B.
EDMONSON CO. HART CO. L.B.
DOB CREEK L.B.
ROCK CREEK R.B.
THALWEG

GREEN RIVER AT MUNFORDVILLE, KY

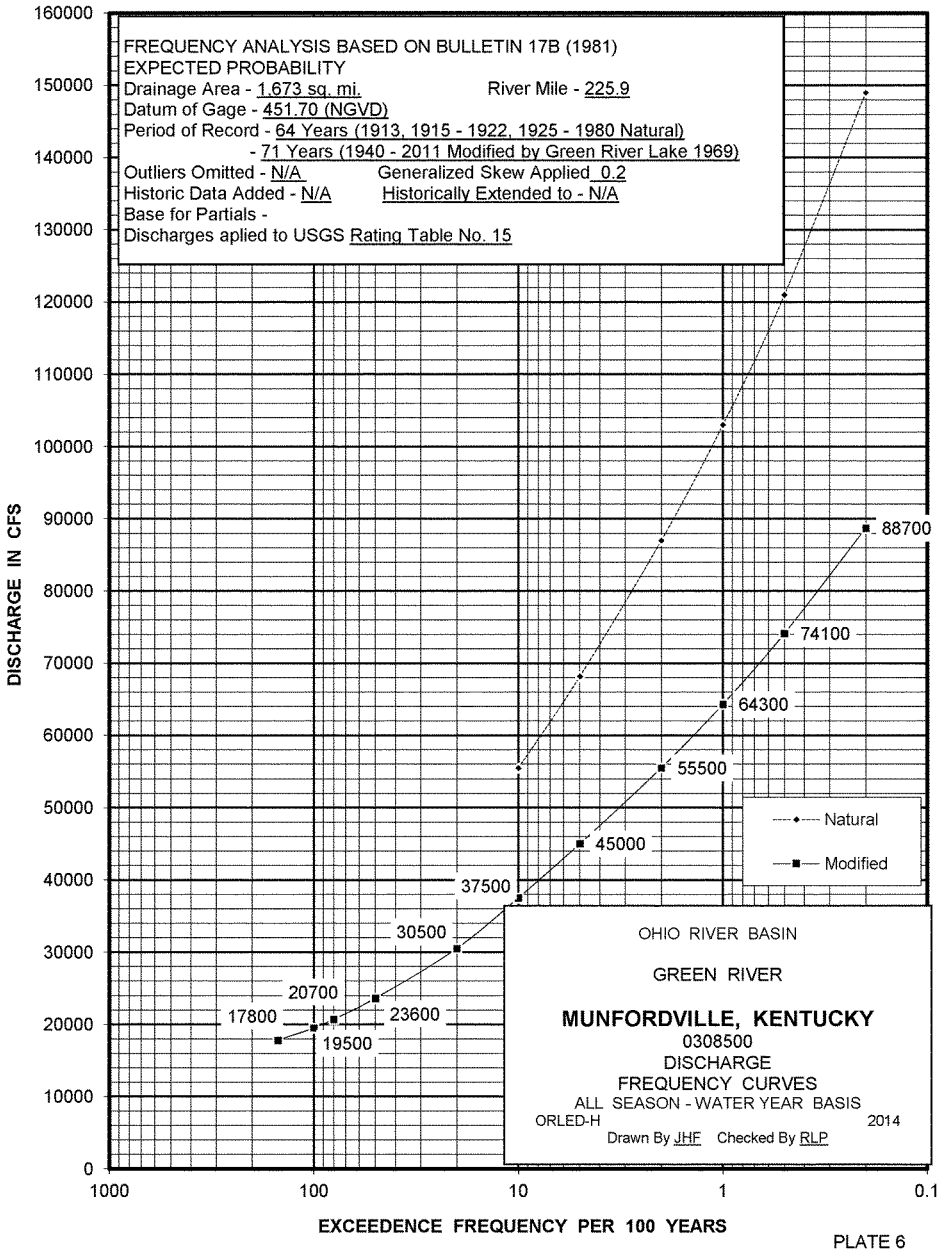


PLATE 6

GREEN RIVER AT MUNFORDVILLE, KY.

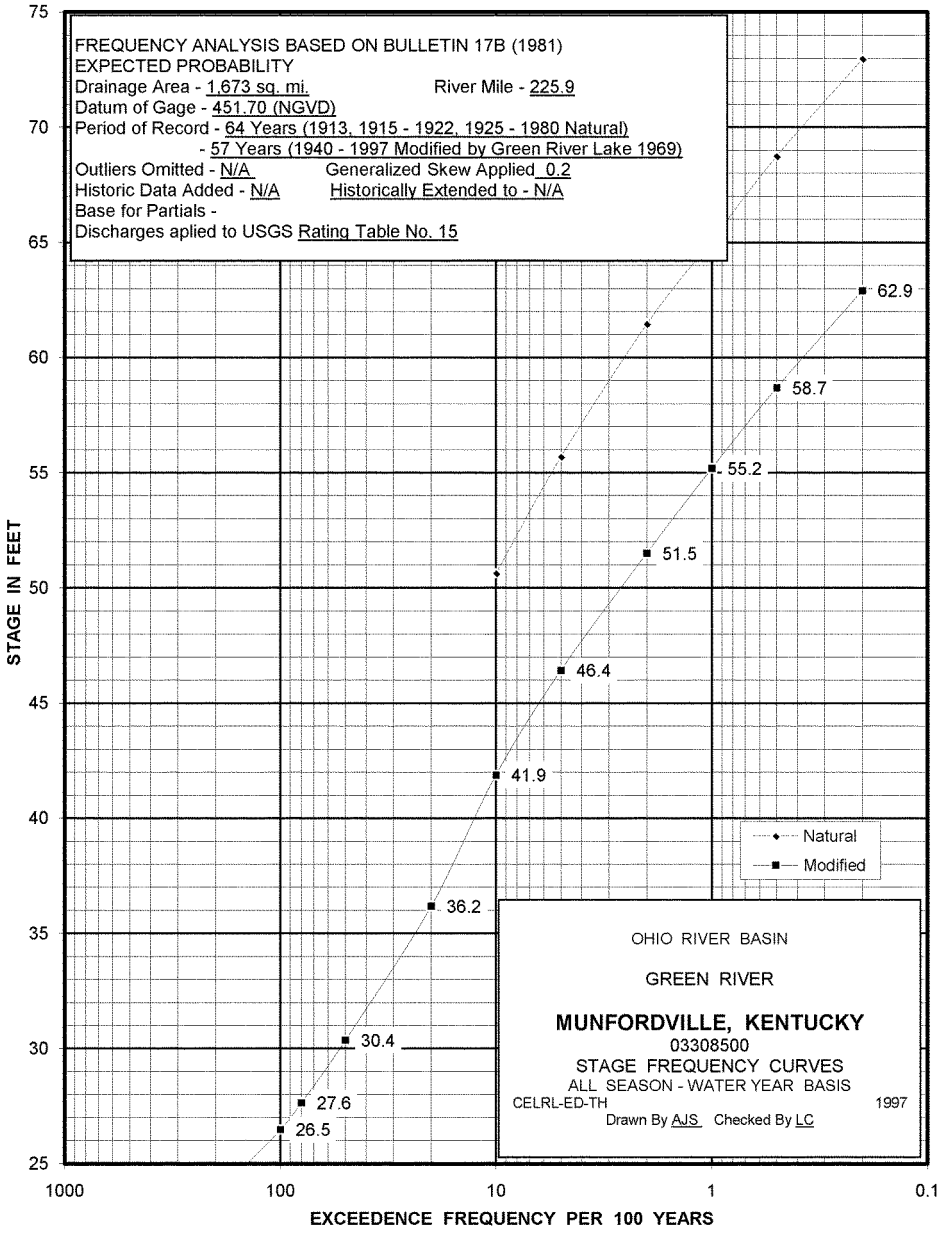


PLATE 7

NOLIN RIVER AT KYROCK, KY.

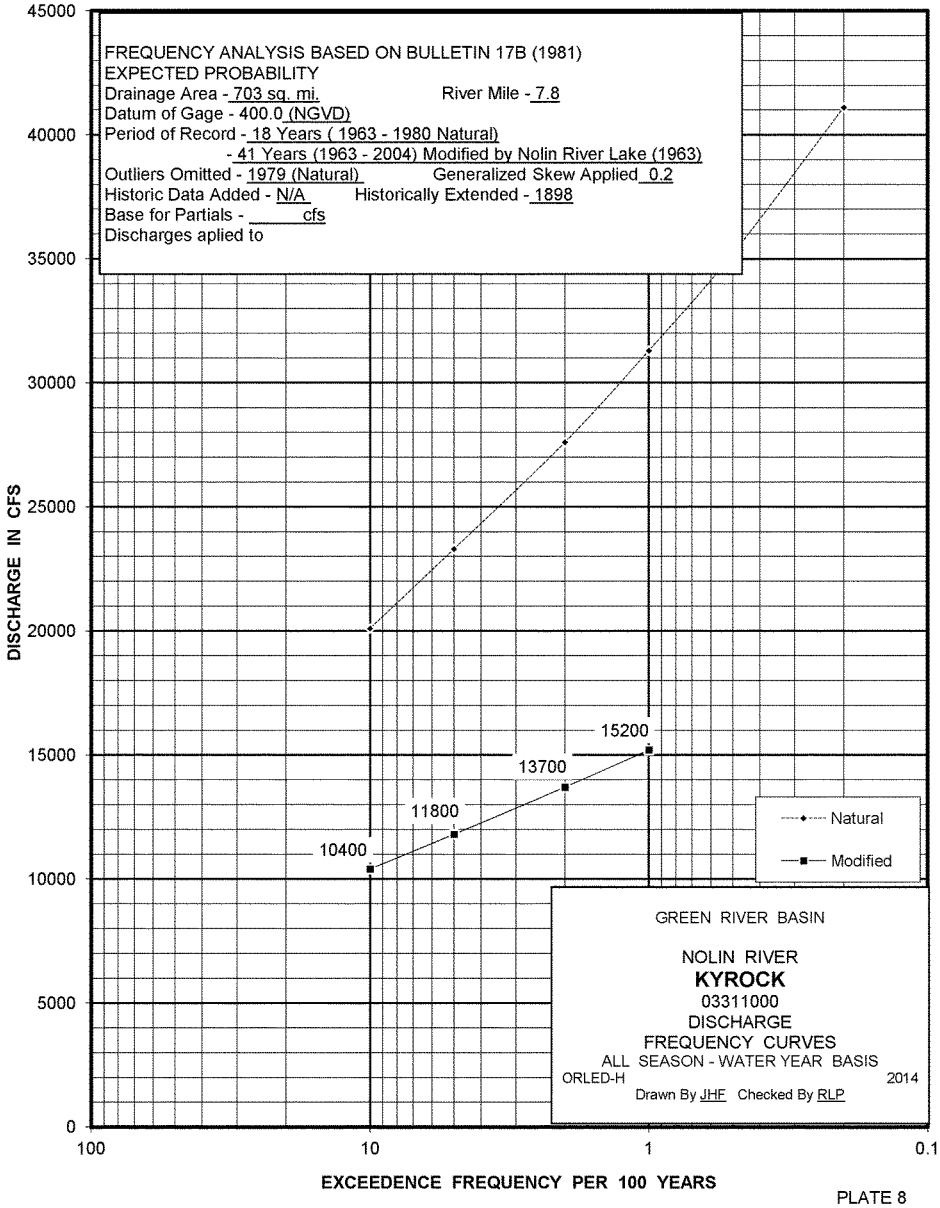


PLATE 8

NOILN RIVER AT KYROCK, KY.

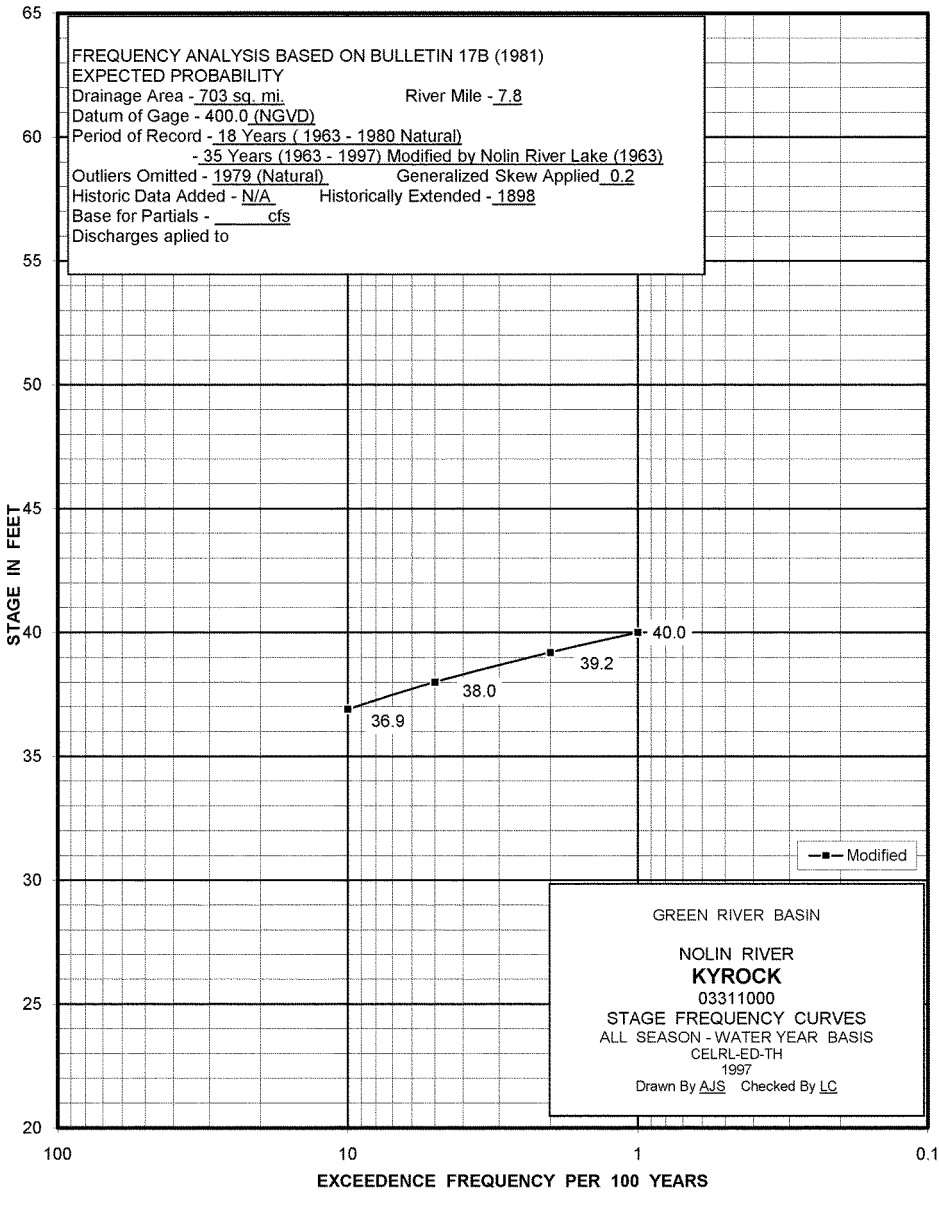
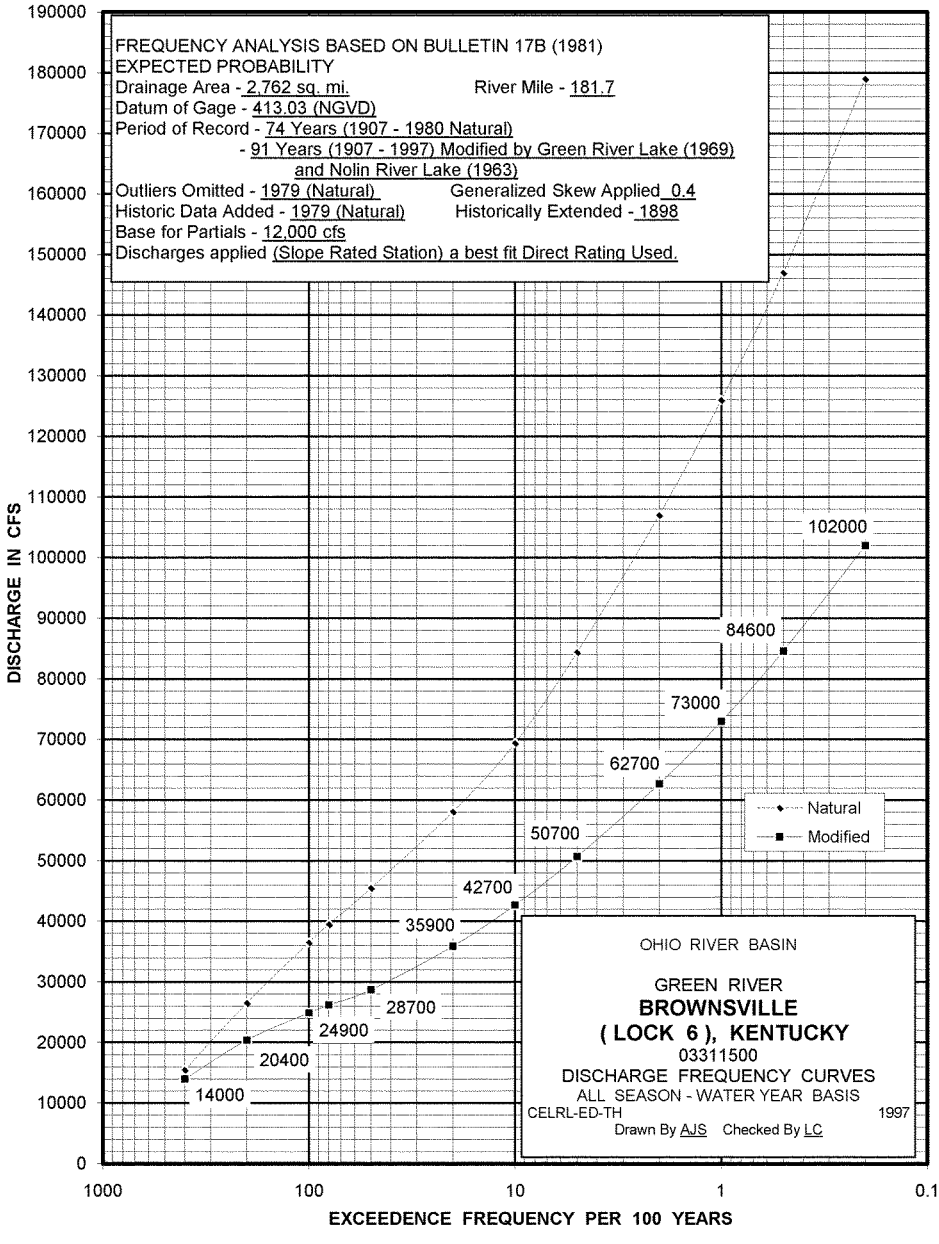


PLATE 9

GREEN RIVER AT BROWNSVILLE (LOCK 6), KY.



PATE 10

GREEN RIVER AT BROWNSVILLE (LOCK 6), KY.

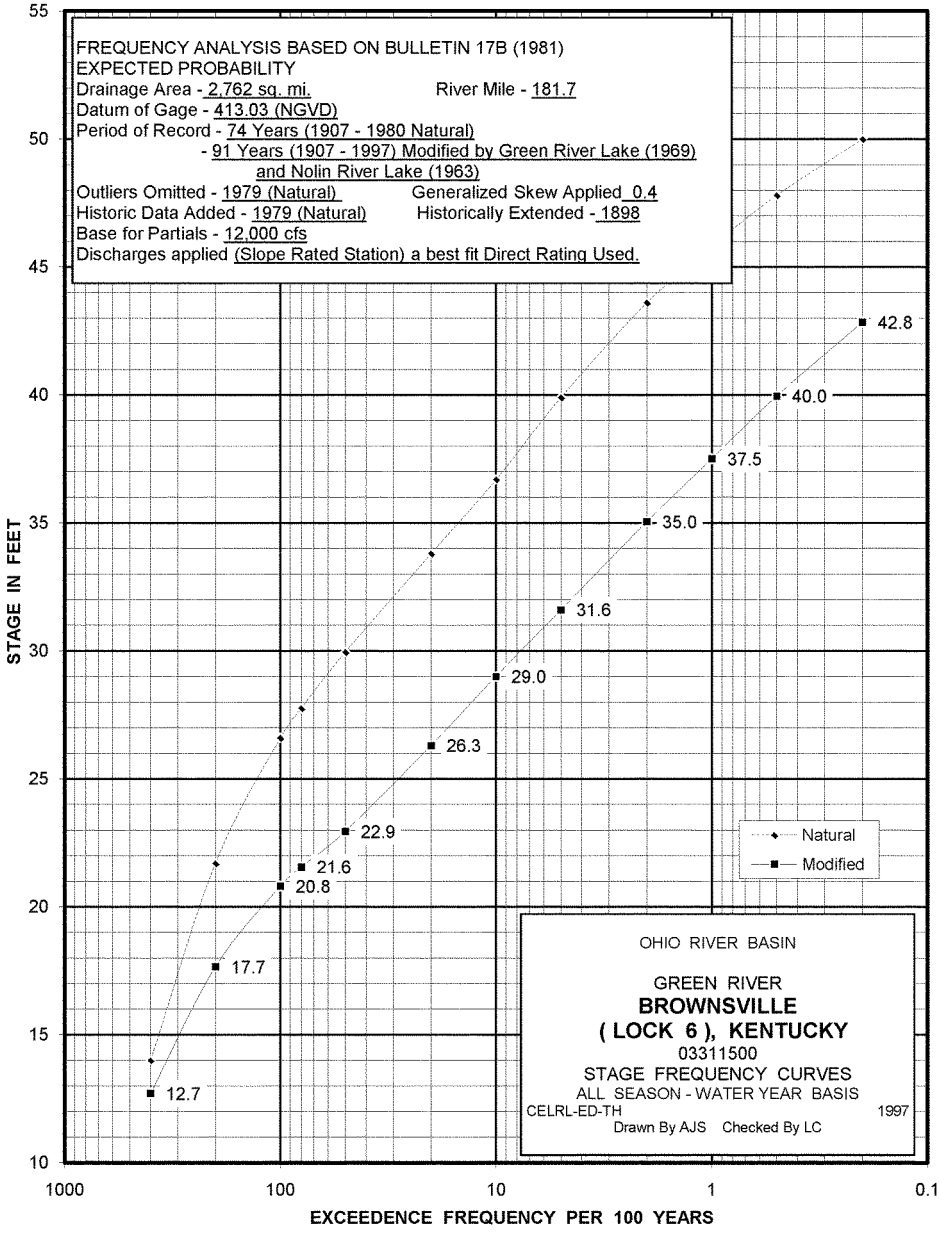


PLATE 11

BARREN RIVER AT BOWLING GREEN, KY.

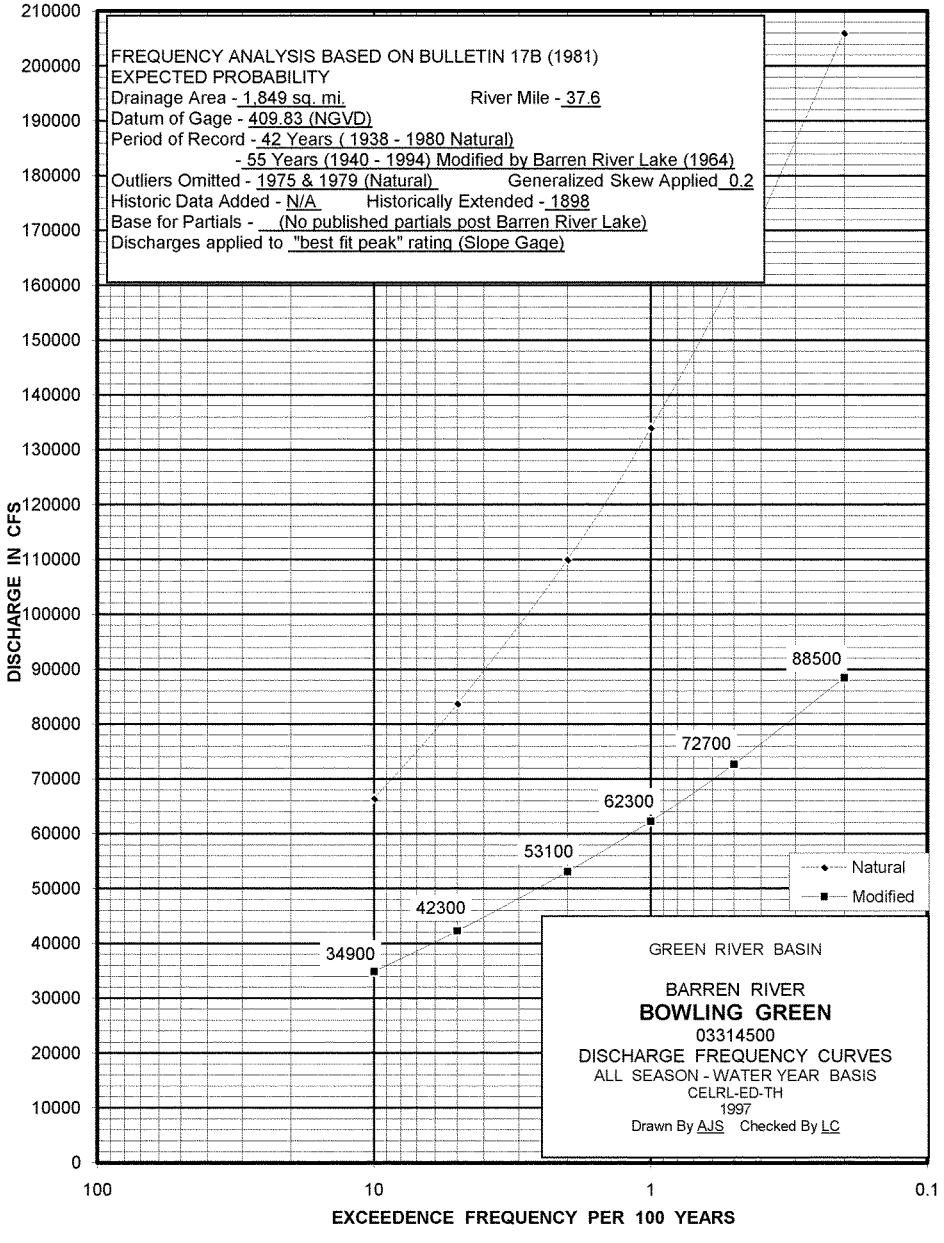


PLATE 12

BARREN RIVER AT BOWLING GREEN, KY.

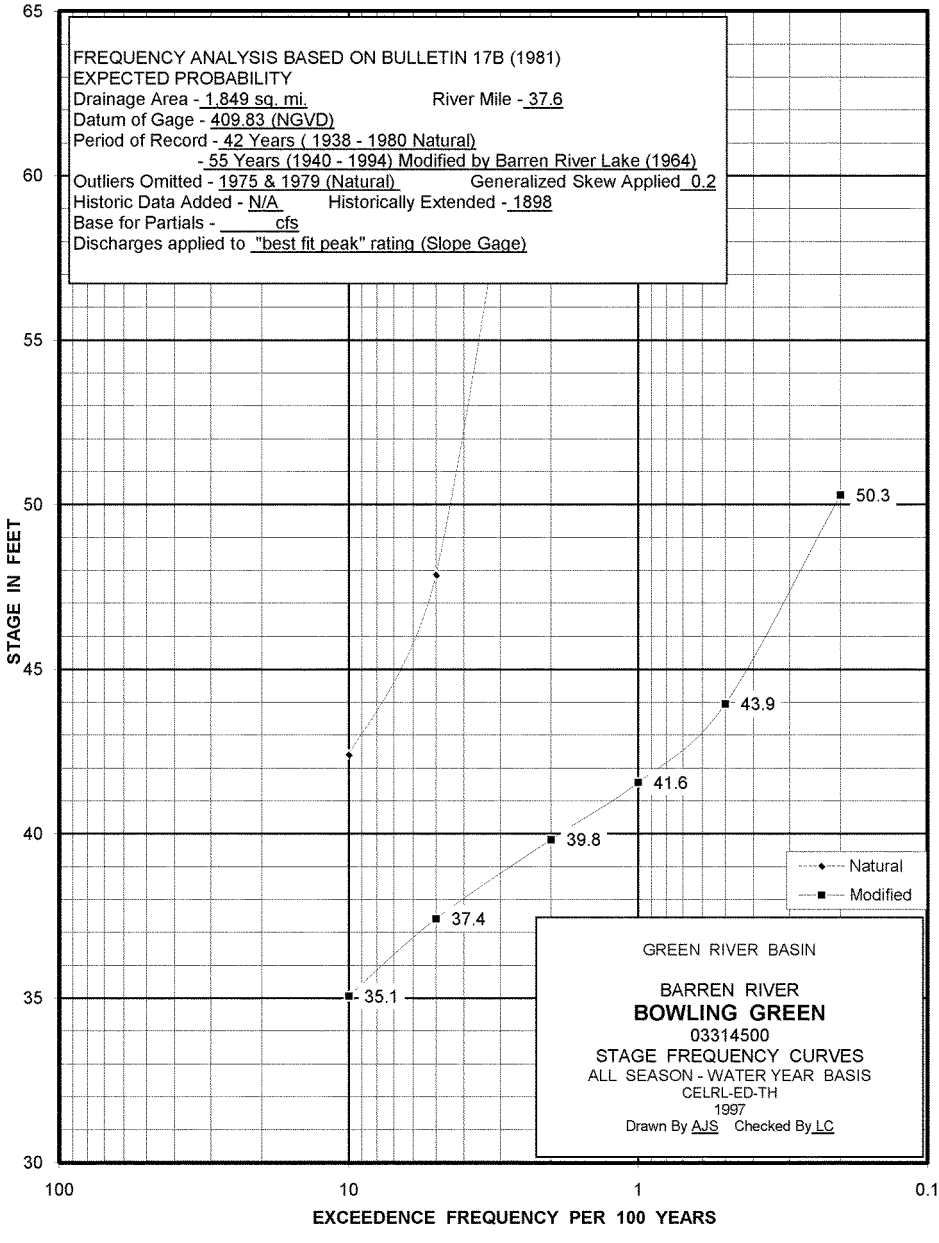


PLATE 13

GREEN RIVER AT WOODBURY (LOCK 4), KY.

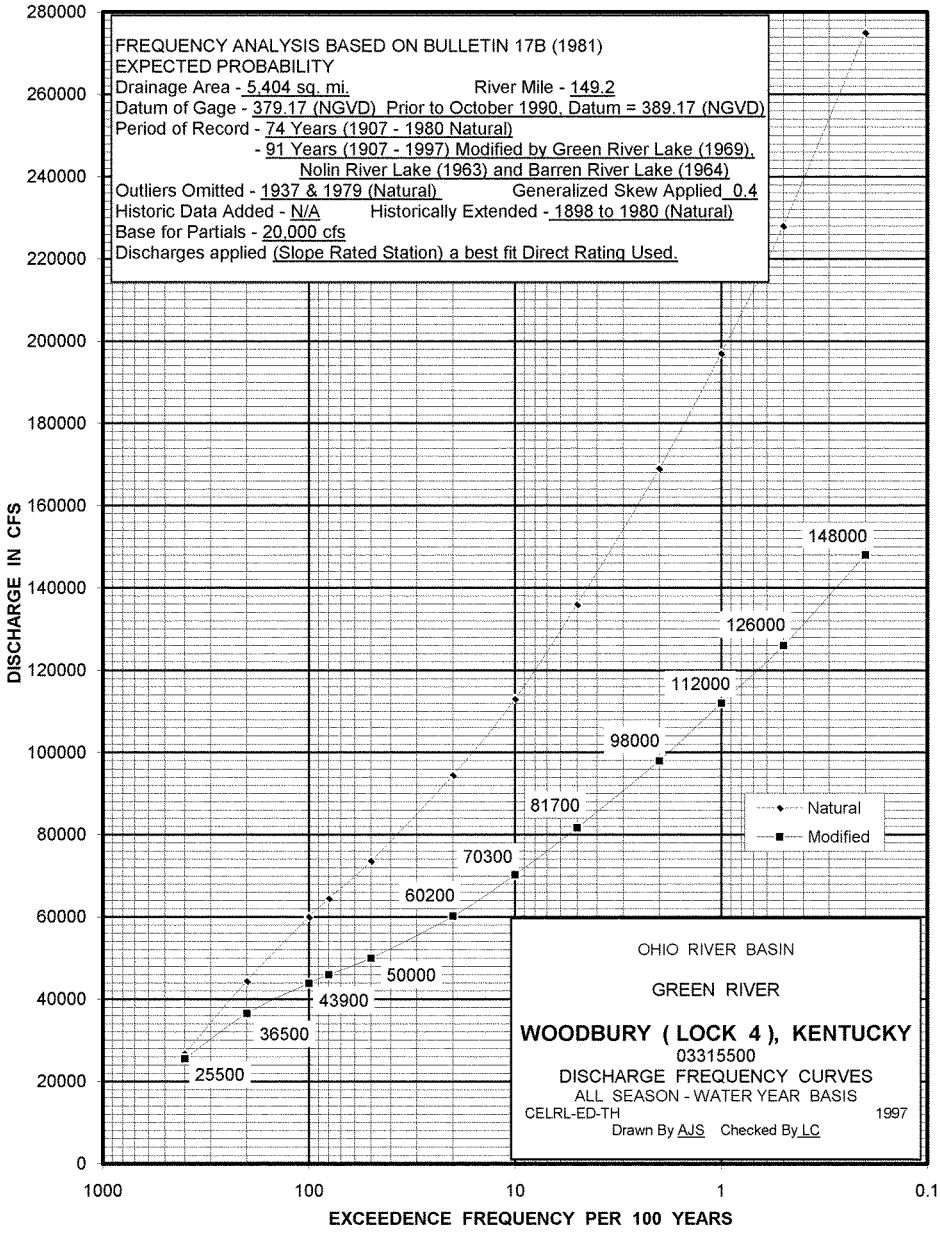


PLATE 14

GREEN RIVER AT WOODBURY (LOCK 4), KY.

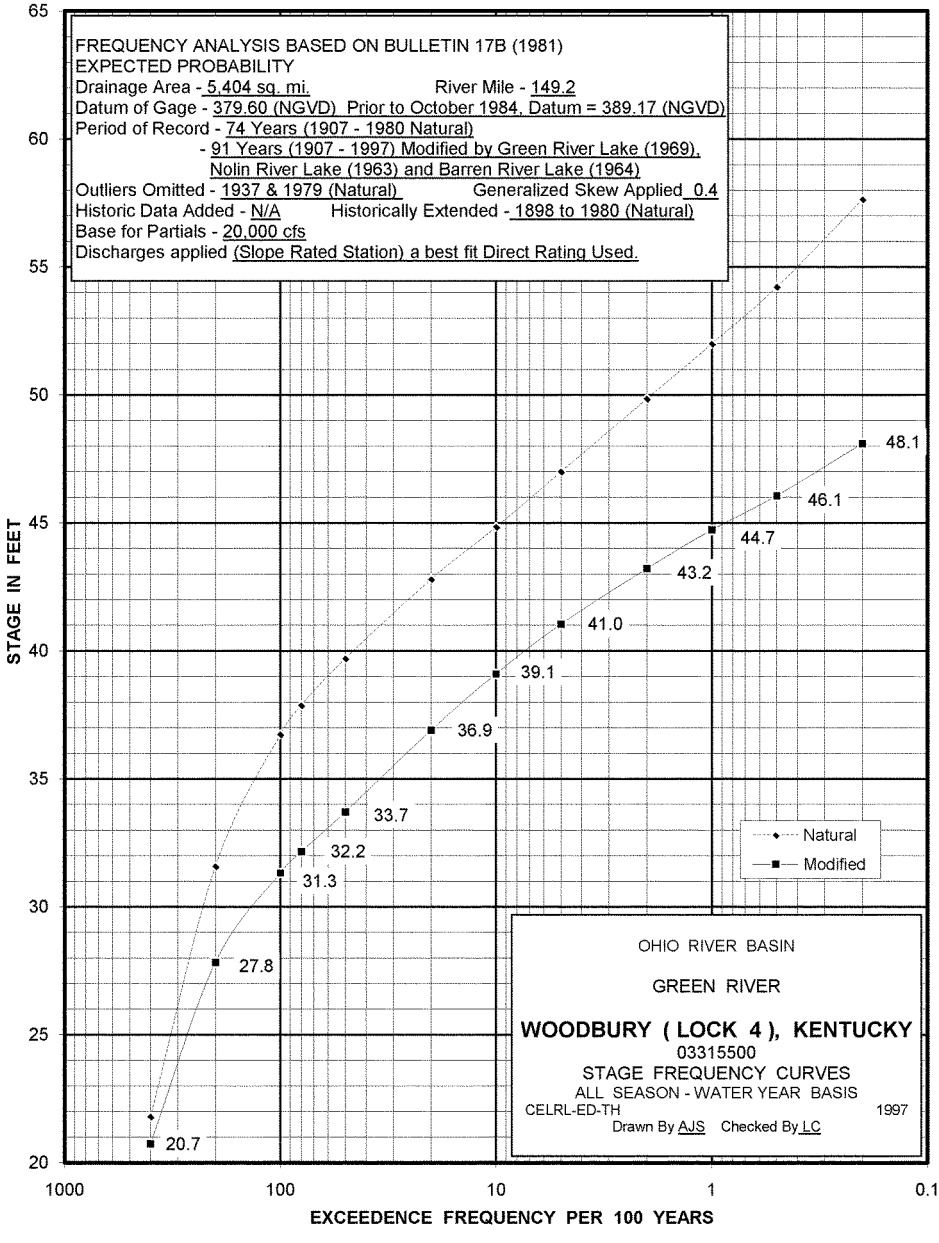


PLATE 15

GREEN RIVER AT PARADISE, KY.

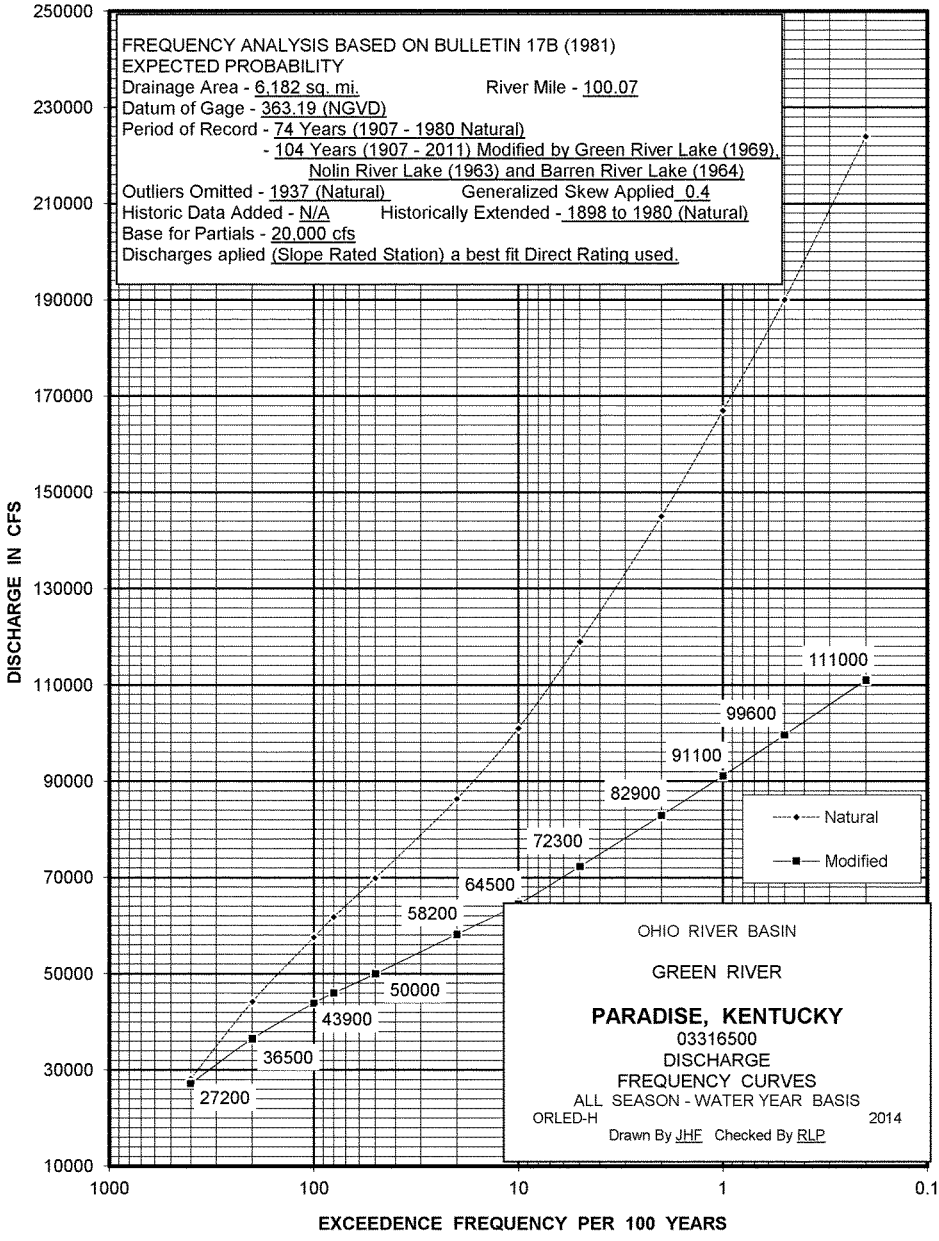


PLATE 16

GREEN RIVER AT PARADISE, KY.

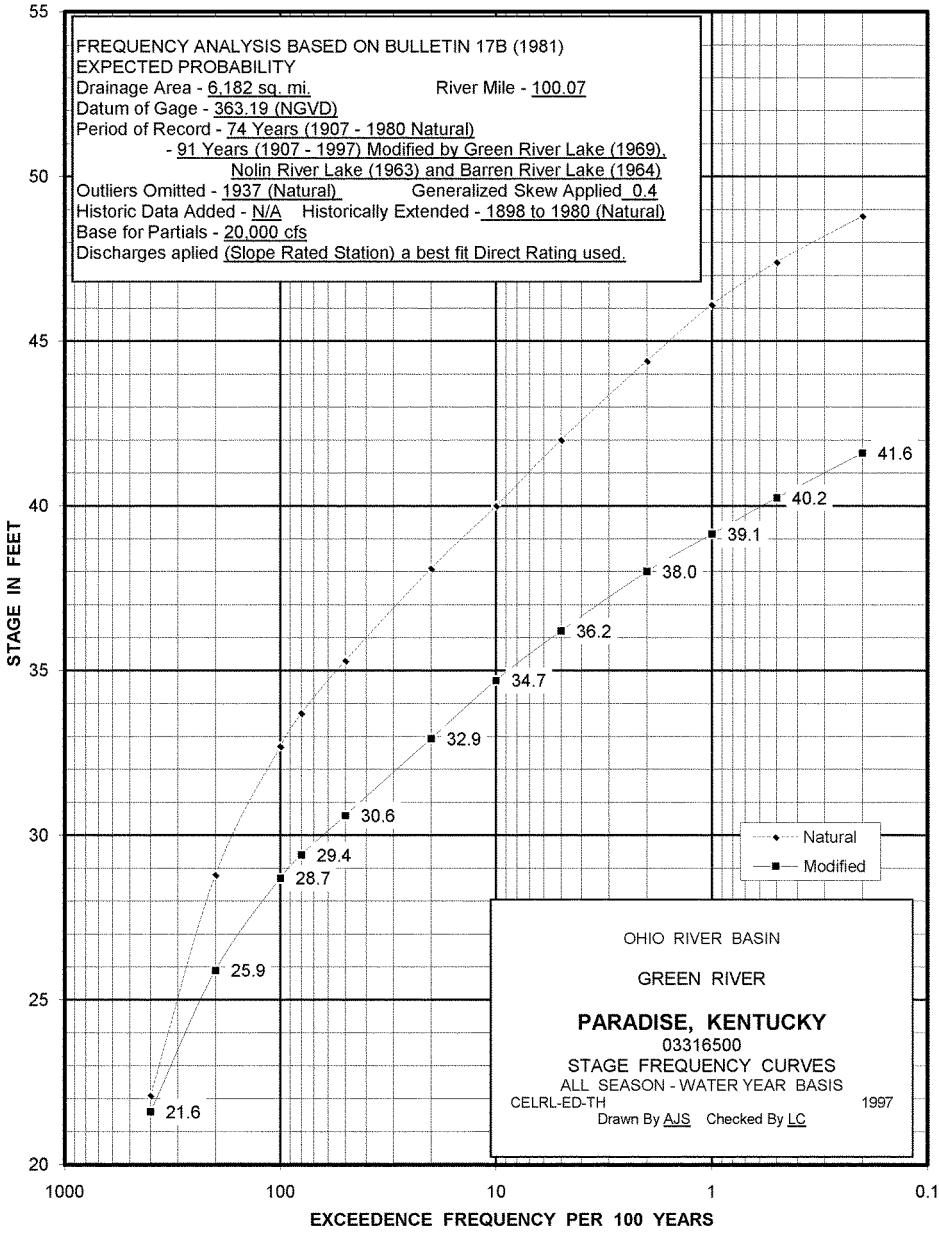


PLATE 17

ROUGH RIVER AT FALLS OF ROUGH, KY.

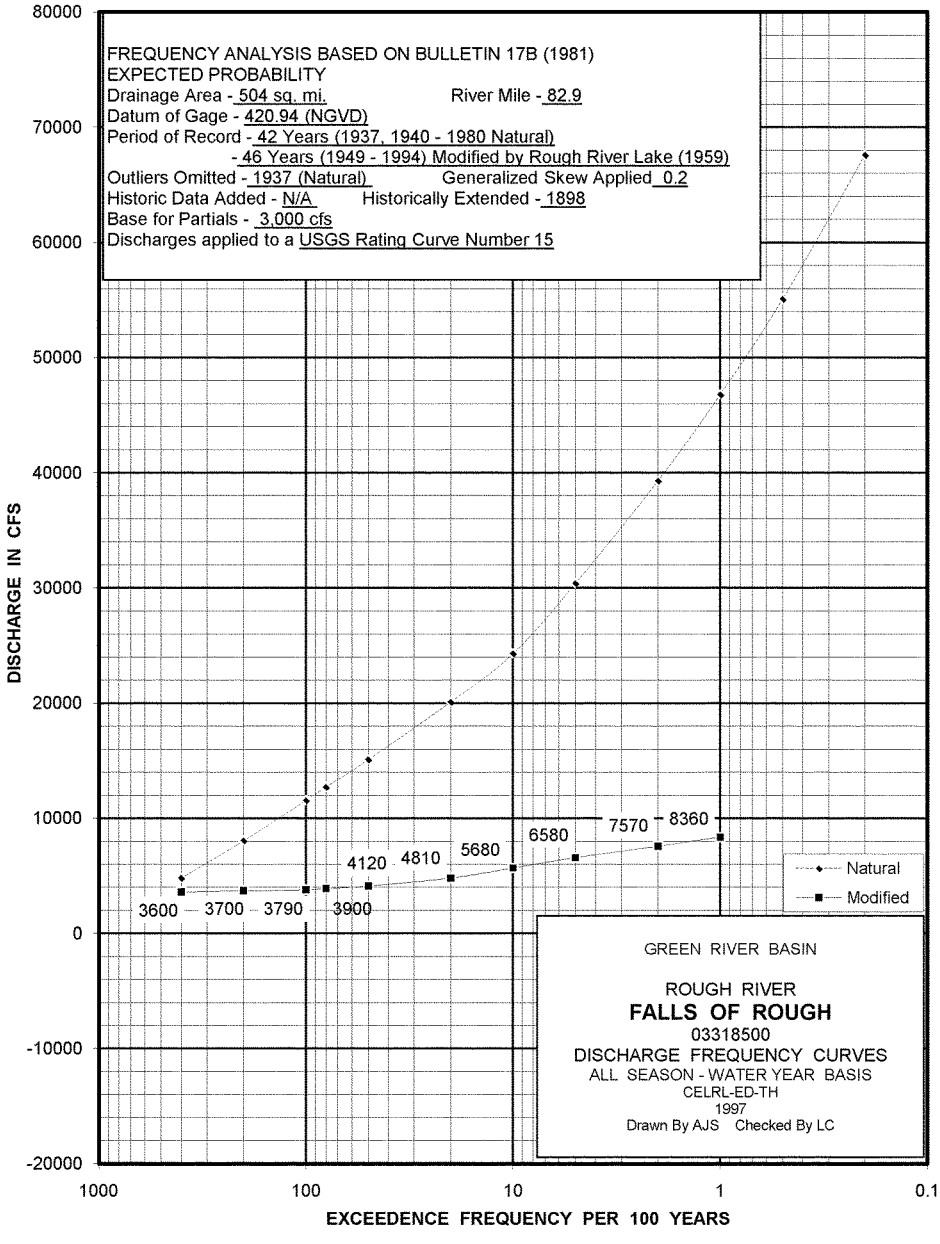


PLATE 18

ROUGH RIVER AT FALLS OF ROUGH, KY.

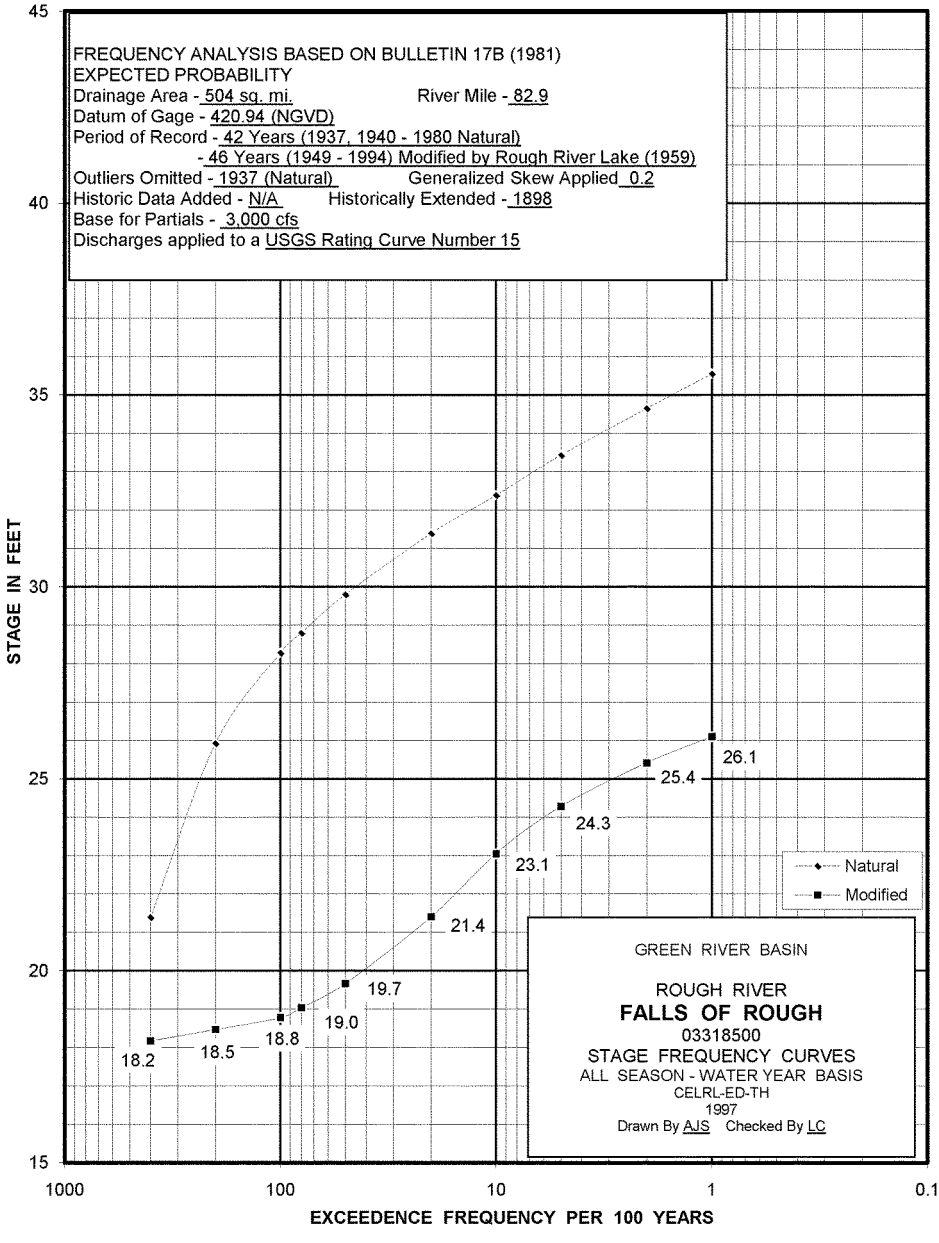


PLATE 19

GREEN RIVER AT CALHOUN (LOCK 2), KY

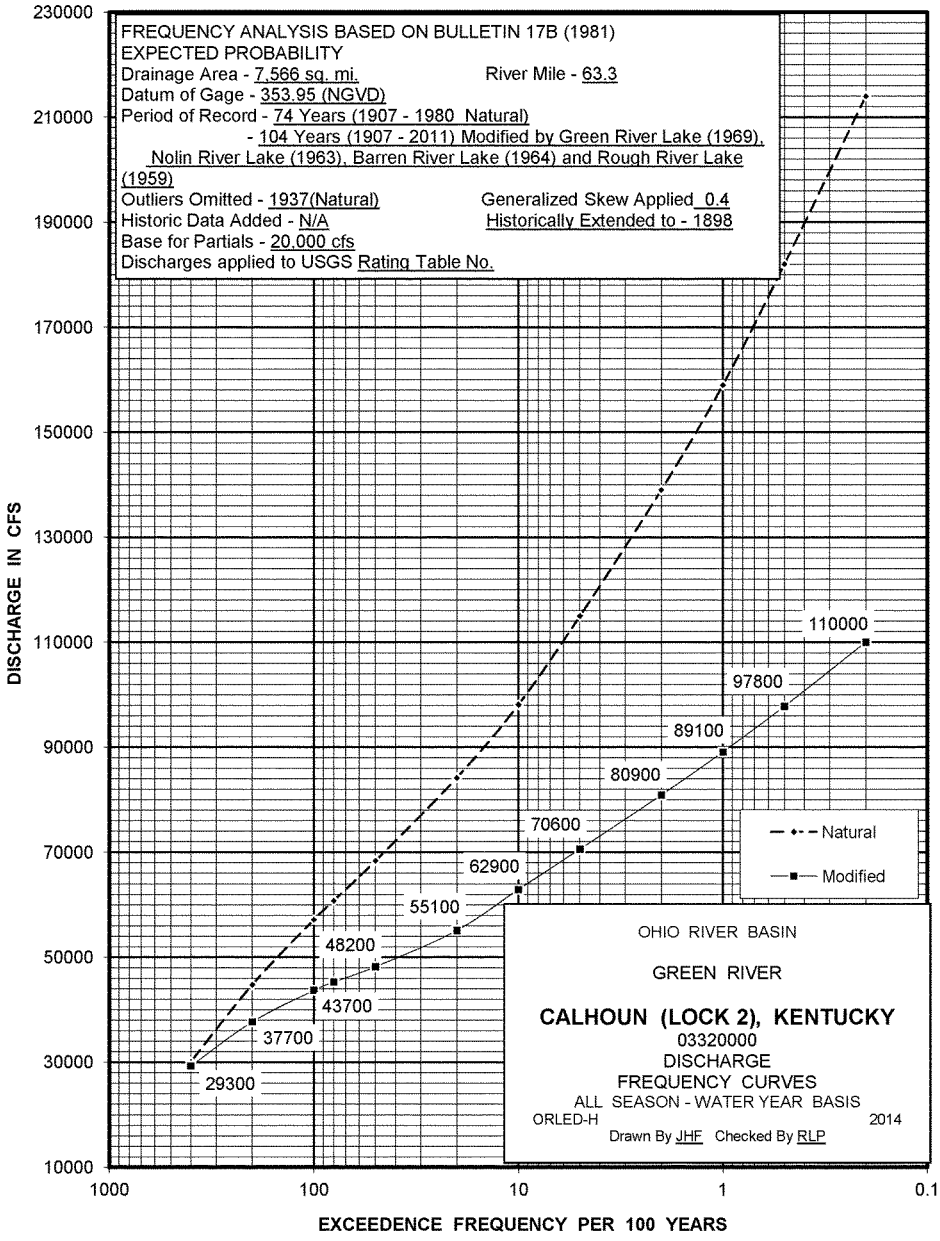


PLATE 20

GREEN RIVER AT CALHOUN (LOCK 2), KY.

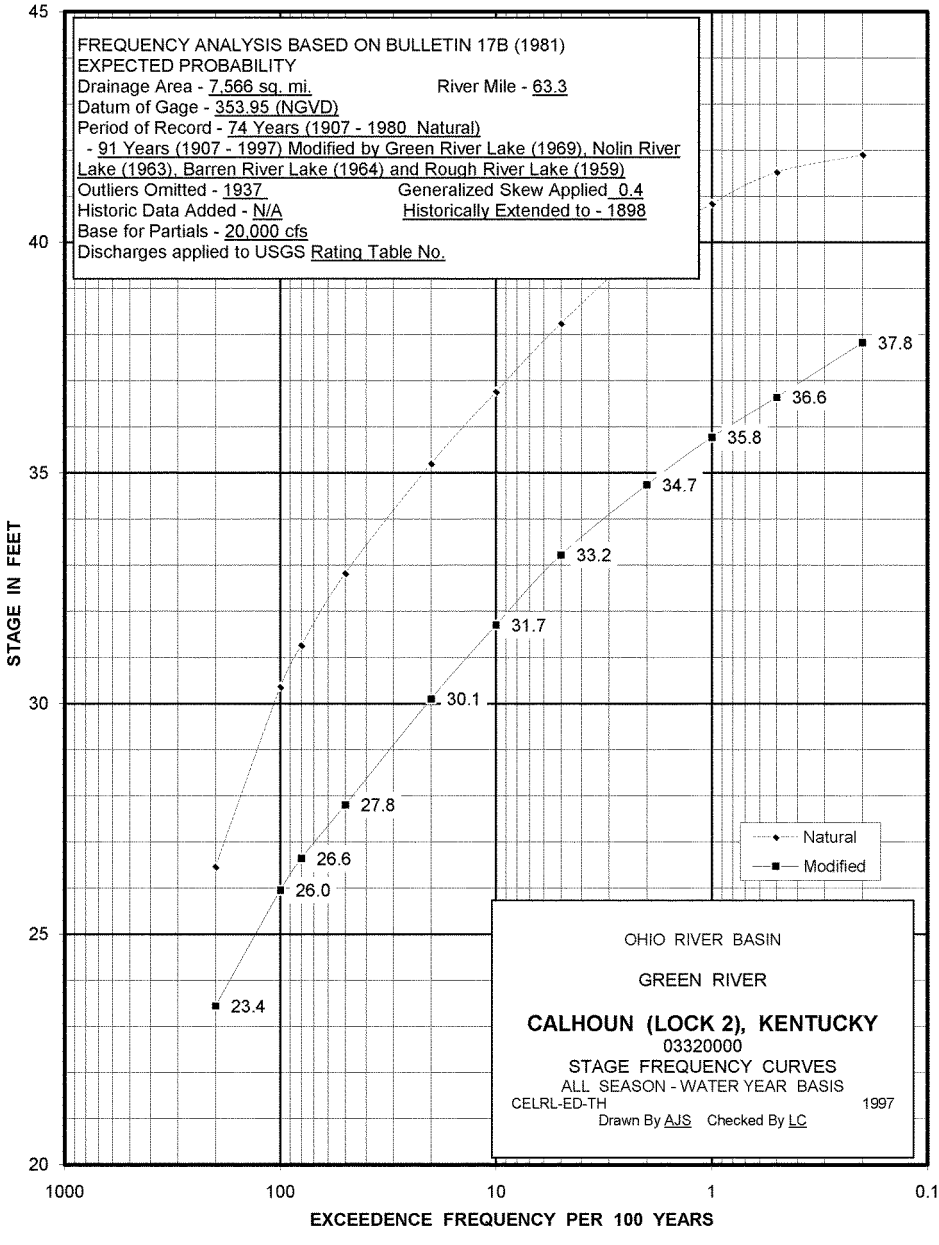


PLATE 21

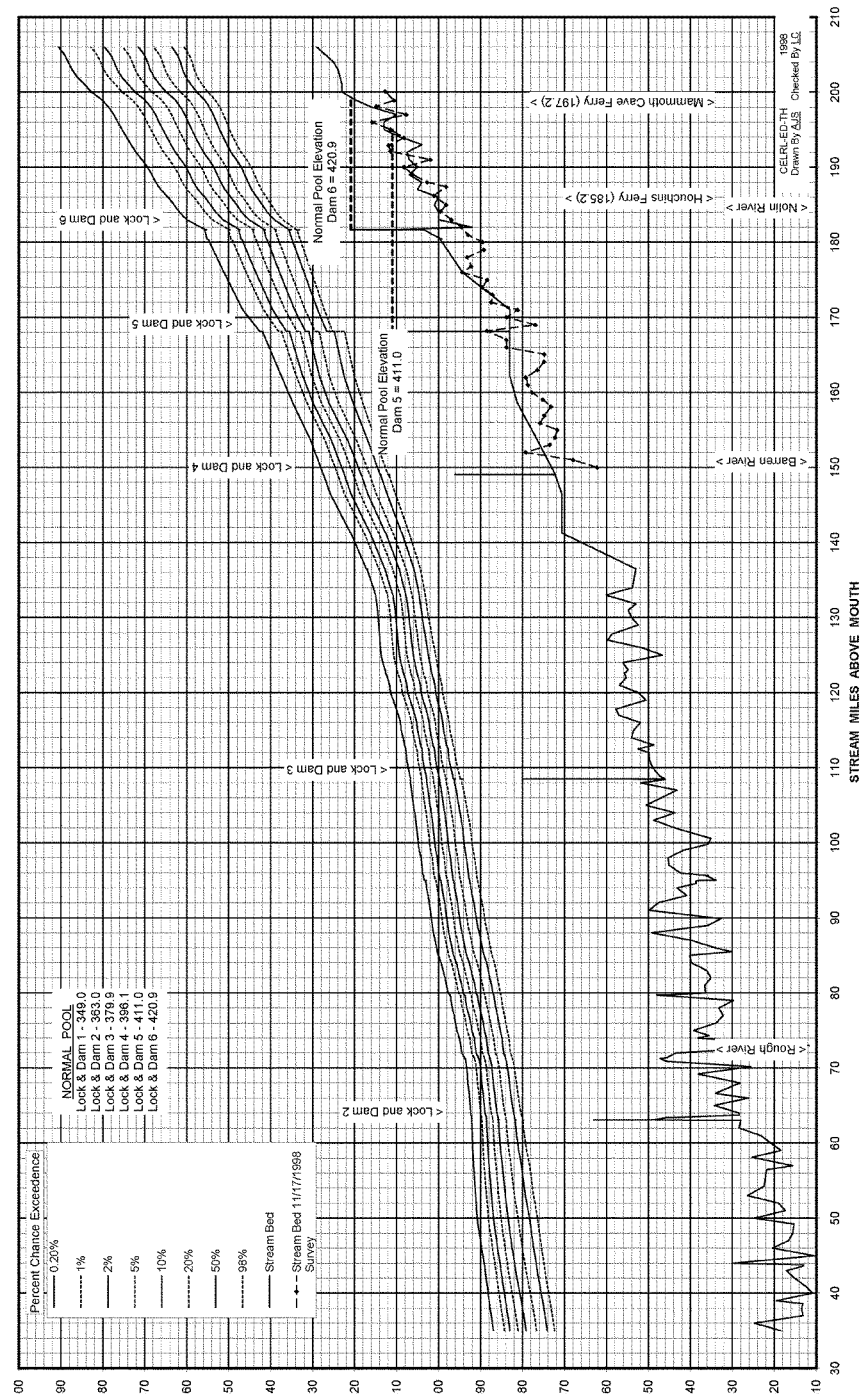

GREEN RIVER - KENTUCKY
EXISTING CONDITION -- PERCENT CHANCE EXCEEDENCE FLOODS
Percent Chance Exceedence:
0.20%
1%
2%
5%
10%
20%
50%
98%
Stream Bed
Stream Bed 11/17/1998 Survey
NORMAL POOL
Lock & Dam 1 - 349.0
Lock & Dam 2 - 363.0
Lock & Dam 3 - 379.9
Lock & Dam 4 - 398.1
Lock & Dam 5 - 411.0
Lock & Dam 6 - 420.9
< Lock and Dam 2
< Lock and Dam 3
< Lock and Dam 4
< Lock and Dam 5
< Lock and Dam 6
Normal Pool Elevation Dam 5 = 411.0
Normal Pool Elevation Dam 6 = 420.9
< Rough River >
< Barren River >
< Nolin River >
< Hutchins Ferry (185.2) >
< Mammoth Cave Ferry (197.2) >
CELRL-ED-TH
Drawn By AJS
1998
Checked By LC
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
500
490
480
470
460
450
440
430
420
410
400
390
380
370
360
350
340
330
320
310
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210

PLATE 22 (a)

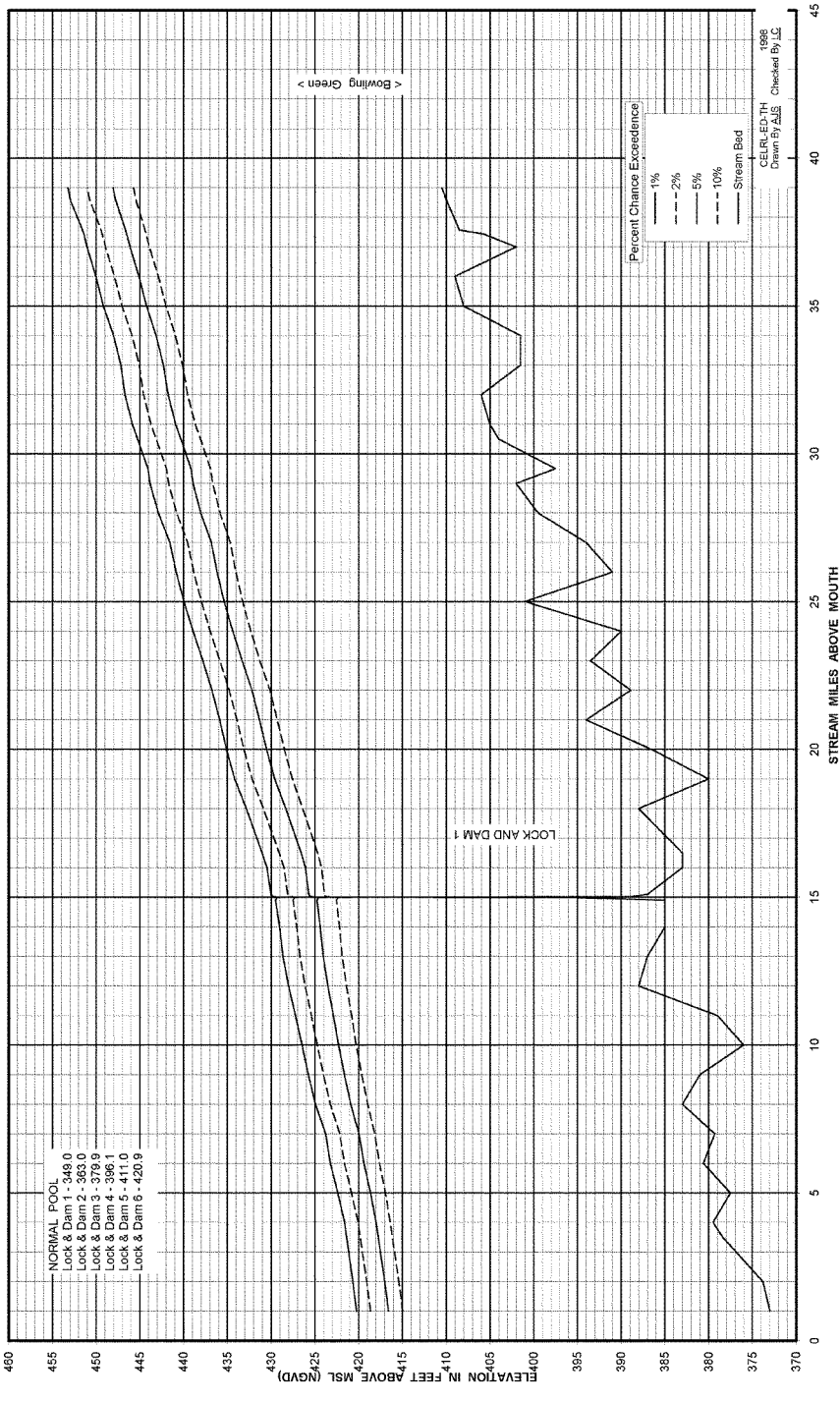
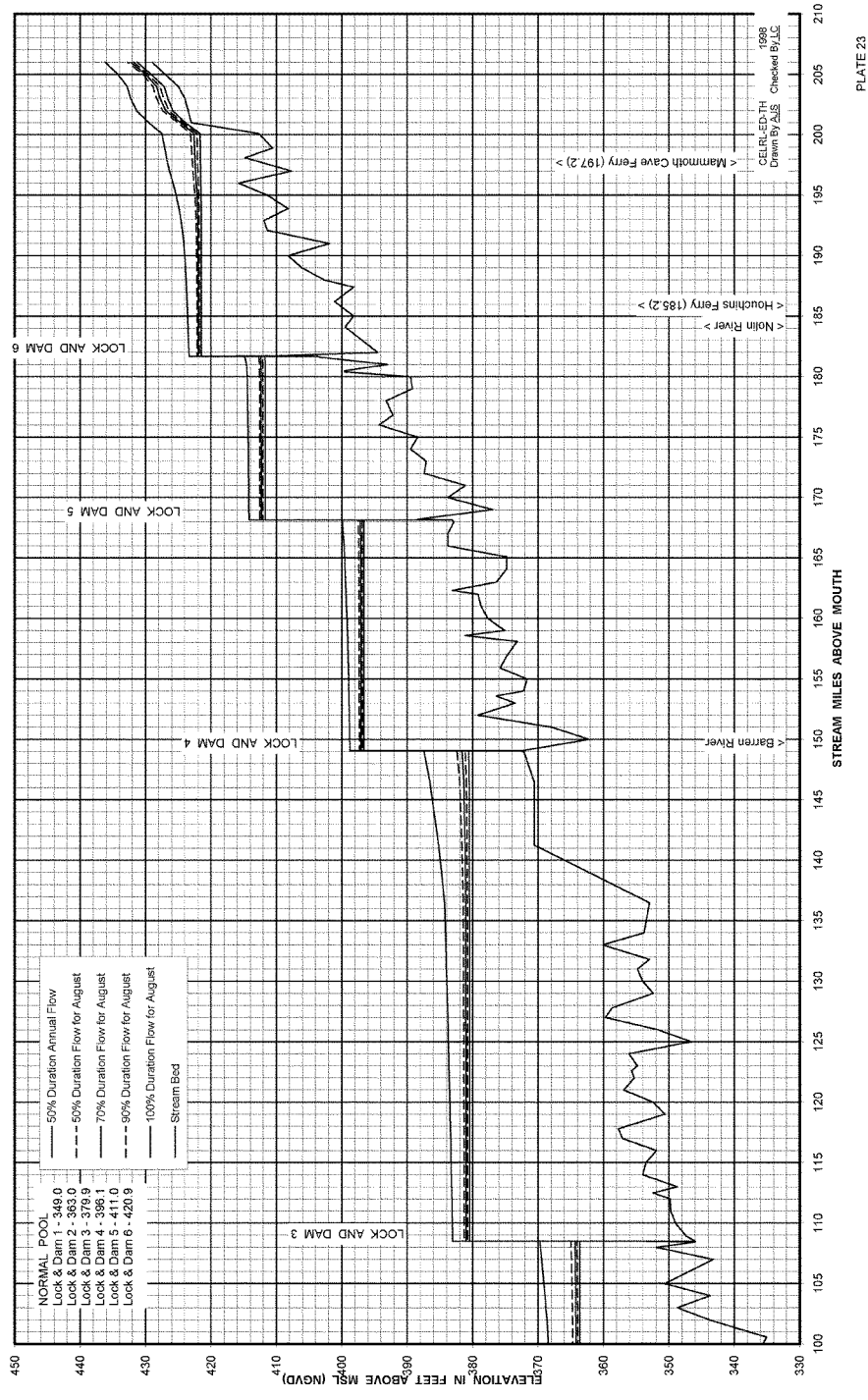

BARREN RIVER - KENTUCKY
EXISTING CONDITIONS - PERCENT CHANCE EXCEEDENCE FLOODS
NORMAL POOL
Lock & Dam 1 - 349.0
Lock & Dam 2 - 363.0
Lock & Dam 3 - 379.9
Lock & Dam 4 - 396.1
Lock & Dam 5 - 411.0
Lock & Dam 6 - 420.9
< Bowling Green >
LOCK AND DAM 1
Percent Chance Exceedence
1%
2%
5%
10%
Stream Bed
CELRL-ED-TH
Drawn By AJS
1996
Checked By LC
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
460
455
450
445
440
435
430
425
420
415
410
405
400
395
390
385
380
375
370
0
5
10
15
20
25
30
35
40
45

PLATE 22 (b)


GREEN RIVER - KENTUCKY
DESIGN CONDITIONS - ALL LOCKS AND DAMS IN PLACE
NORMAL POOL
Lock & Dam 1 - 349.0
Lock & Dam 2 - 363.0
Lock & Dam 3 - 379.9
Lock & Dam 4 - 396.1
Lock & Dam 5 - 411.0
Lock & Dam 6 - 420.9
50% Duration Annual Flow
50% Duration Flow for August
70% Duration Flow for August
90% Duration Flow for August
100% Duration Flow for August
Stream Bed
LOCK AND DAM 3
LOCK AND DAM 4
LOCK AND DAM 5
LOCK AND DAM 6
< Barren River >
< Nolin River >
< Houchins Ferry (185.2) >
< Mammoth Cave Ferry (197.2) >
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
CELRL-ED-TH
Drawn By AJS
Checked By LC
1998
PLATE 23

GREEN RIVER - KENTUCKY
ESTIMATED EXISTING CONDITIONS (DAM 4 DETERIORATED)

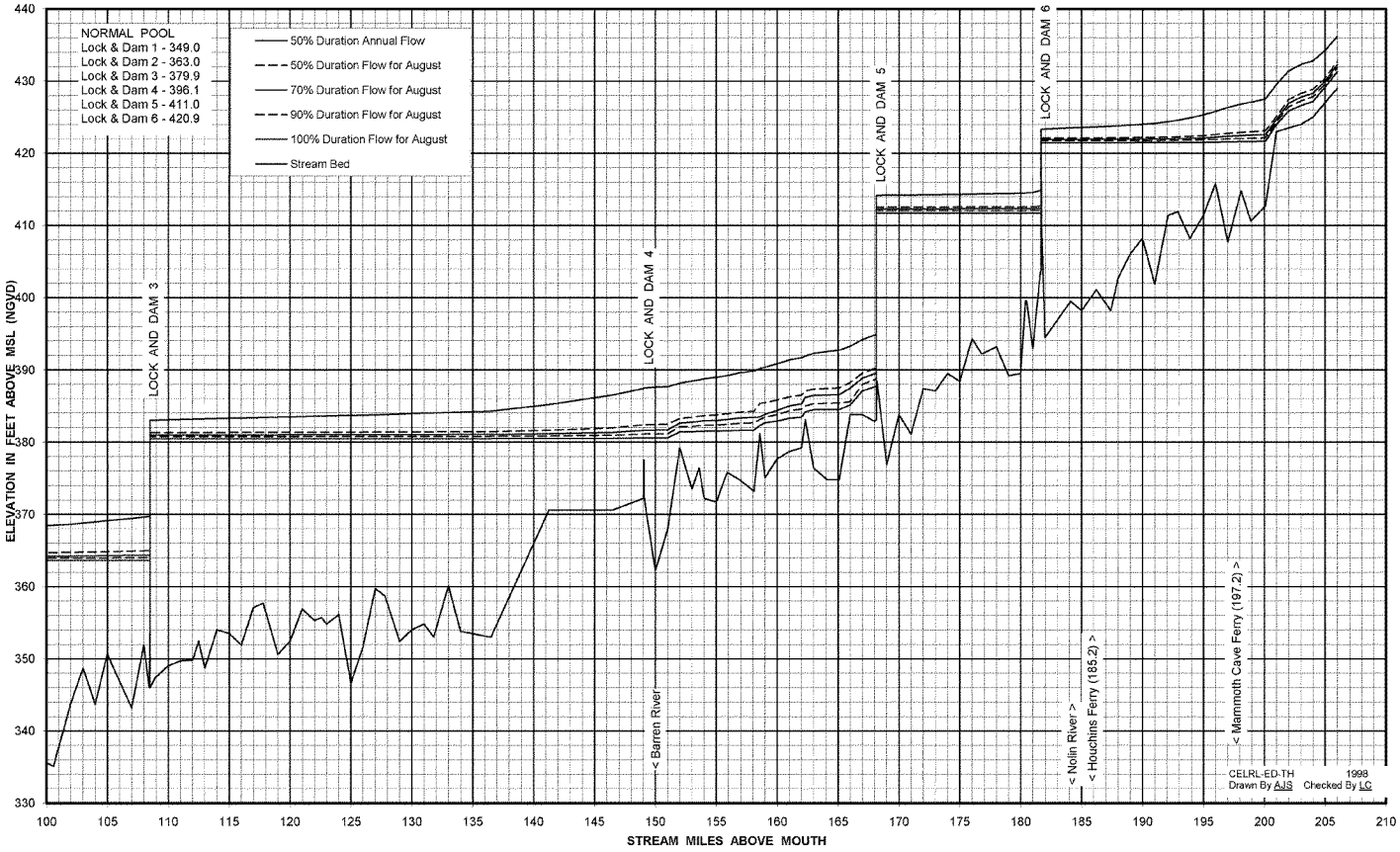
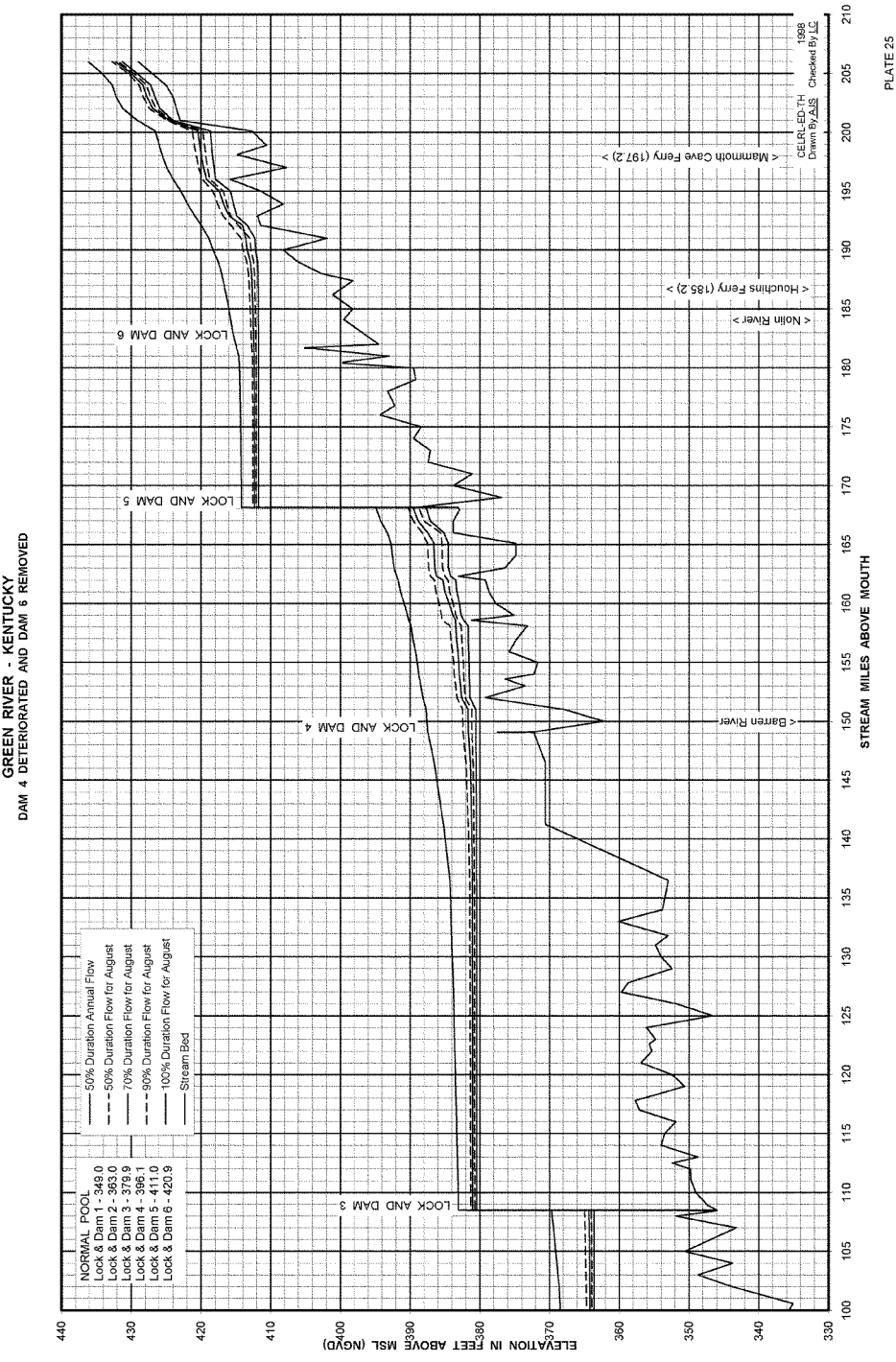


PLATE 24


GREEN RIVER - KENTUCKY
DAM 4 DETERIORATED AND DAM 6 REMOVED
NORMAL POOL
Lock & Dam 1 - 348.0
Lock & Dam 2 - 363.0
Lock & Dam 3 - 379.9
Lock & Dam 4 - 396.1
Lock & Dam 5 - 411.0
Lock & Dam 6 - 420.9
50% Duration Annual Flow
50% Duration Flow for August
70% Duration Flow for August
90% Duration Flow for August
100% Duration Flow for August
Stream Bed
LOCK AND DAM 3
LOCK AND DAM 4
LOCK AND DAM 5
LOCK AND DAM 6
< Barren River >
< Nolin River >
< Houchins Ferry (185.2) >
< Mammoth Cave Ferry (197.2) >
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
CELRL-ED-TH
Drawn By AJS Checked By LC
1998
PLATE 25

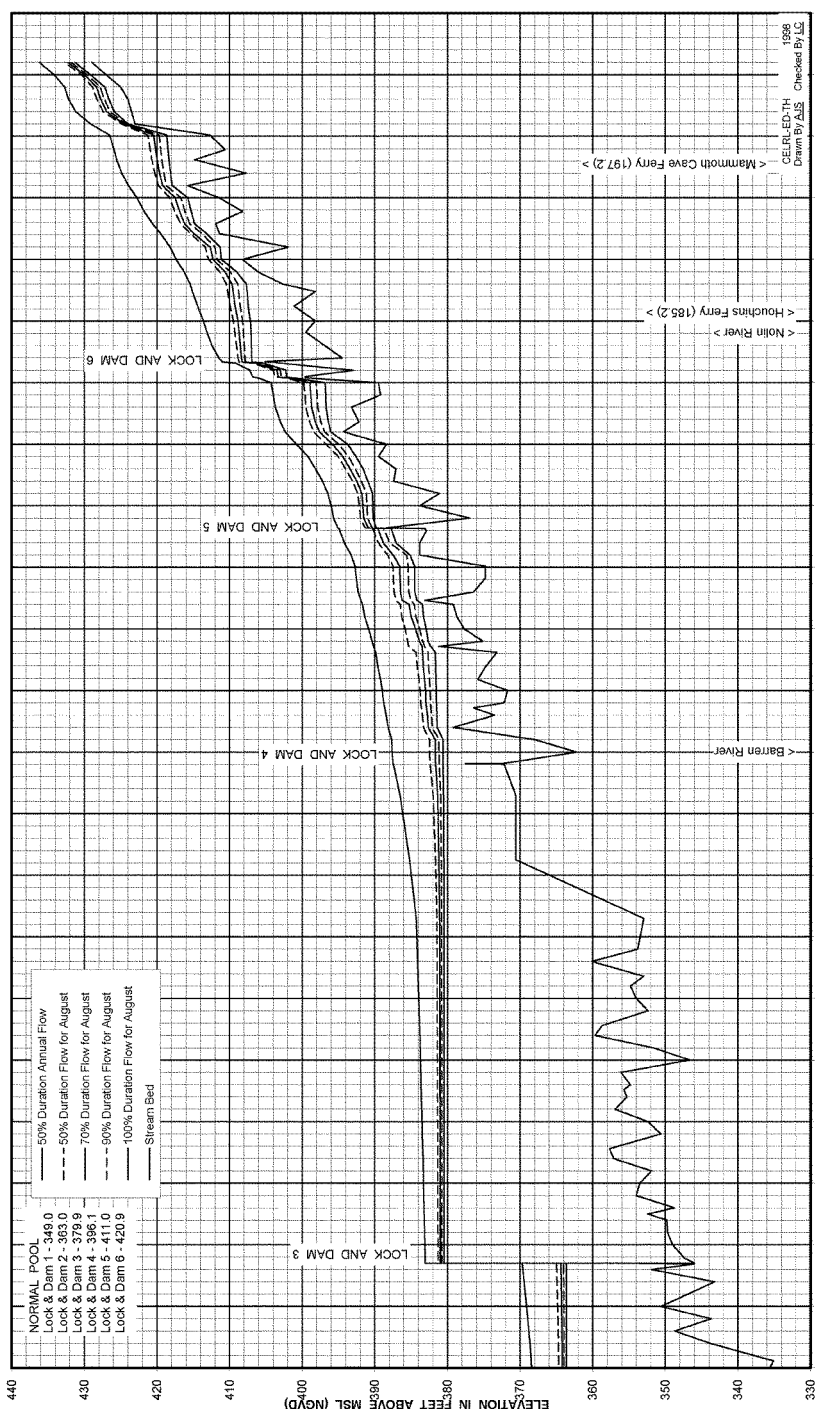

GREEN RIVER - KENTUCKY
DAM 4 DETERIORATED, DAM 5 AND 6 REMOVED
NORMAL POOL
Lock & Dam 1 - 349.0
Lock & Dam 2 - 363.0
Lock & Dam 3 - 379.9
Lock & Dam 4 - 396.1
Lock & Dam 5 - 411.0
Lock & Dam 6 - 420.9
50% Duration Annual Flow
50% Duration Flow for August
70% Duration Flow for August
90% Duration Flow for August
100% Duration Flow for August
Stream Bed
LOCK AND DAM 6
LOCK AND DAM 5
LOCK AND DAM 4
LOCK AND DAM 3
< Mammoth Cave Ferry (197.2) >
< Houchins Ferry (185.2) >
< Nolin River >
< Barren River
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
CELRL-ED-TH
Drawn By AJS
1998
Checked By LC

PLATE 26

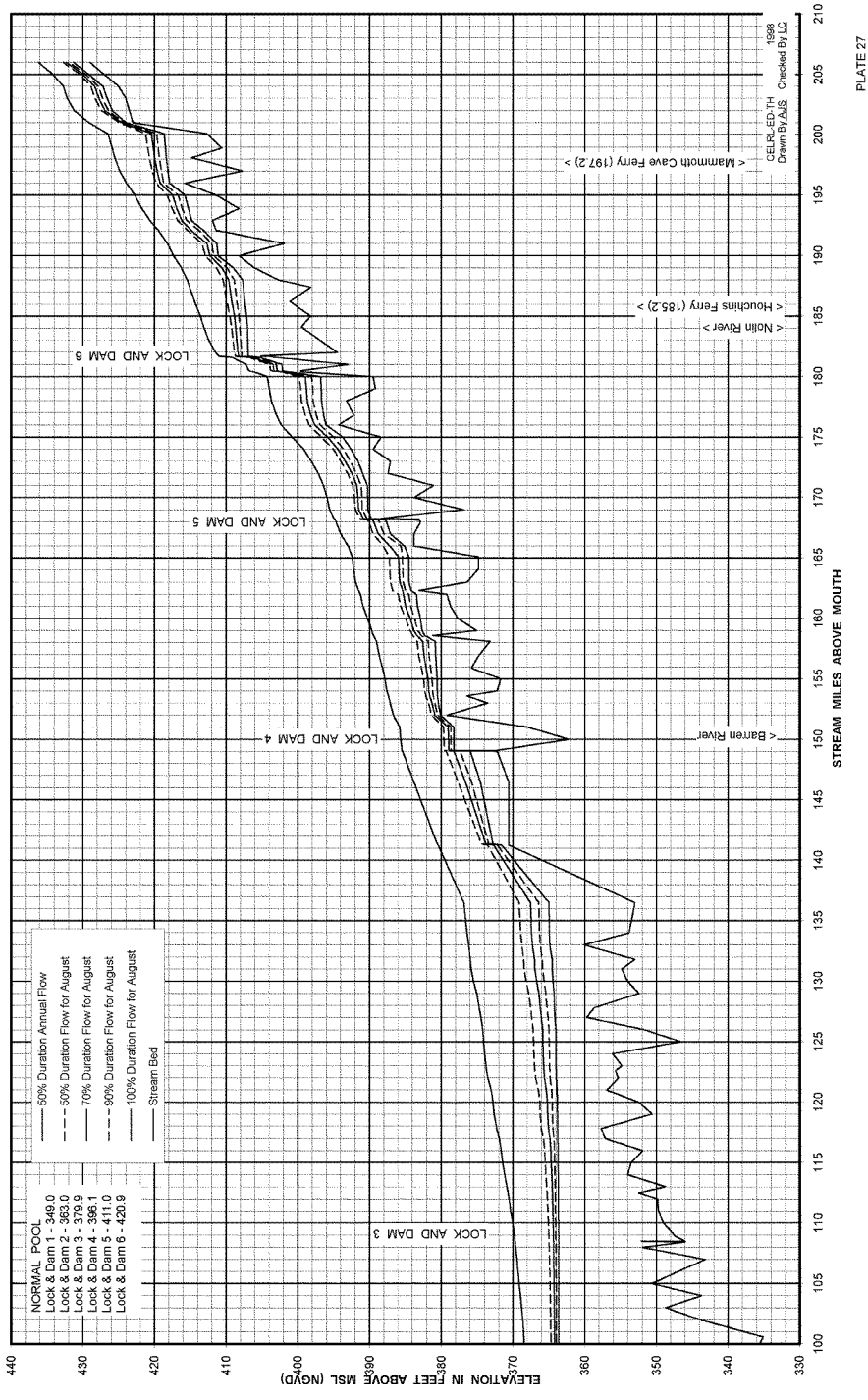

GREEN RIVER - KENTUCKY
DAM 4 DETERIORATED, DAM 3, 5 AND 6 REMOVED
NORMAL POOL
Lock & Dam 1 - 349.0
Lock & Dam 2 - 363.0
Lock & Dam 3 - 379.9
Lock & Dam 4 - 396.1
Lock & Dam 5 - 411.0
Lock & Dam 6 - 420.9
50% Duration Annual Flow
50% Duration Flow for August
70% Duration Flow for August
90% Duration Flow for August
100% Duration Flow for August
Stream Bed
LOCK AND DAM 3
LOCK AND DAM 4
LOCK AND DAM 5
LOCK AND DAM 6
< Barren River >
< Nolin River >
< Houchins Ferry (185.2) >
< Mammoth Cave Ferry (197.2) >
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
CELRL-ED-TH
Drawn By AJS
Checked By LC
1998

PLATE 27

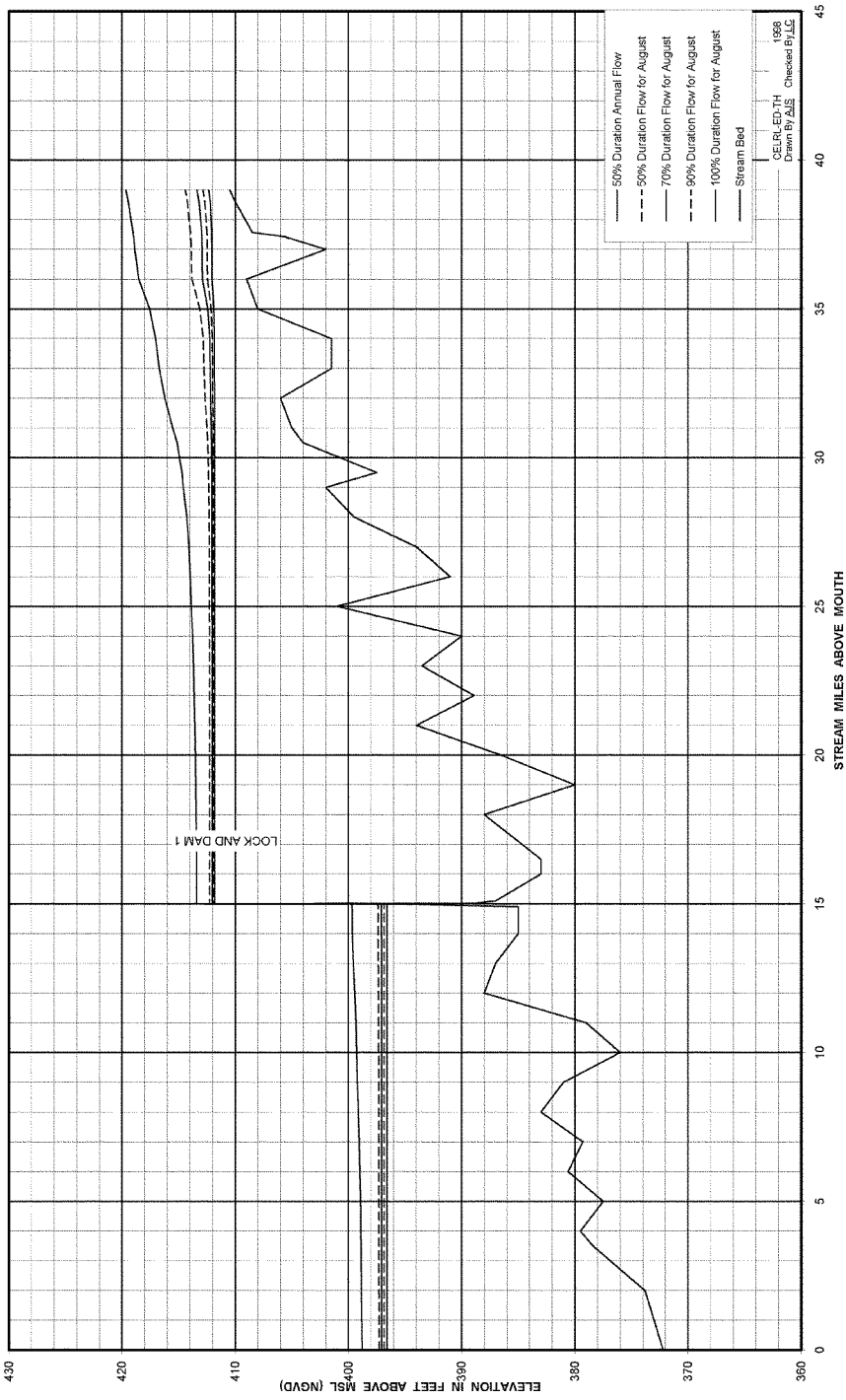

BARREN RIVER - KENTUCKY
DESIGN CONDITIONS - ALL LOCKS AND DAMS IN PLACE
ELEVATION IN FEET ABOVE MSL (NGVD)
STREAM MILES ABOVE MOUTH
LOCK AND DAM 1
50% Duration Annual Flow
50% Duration Flow for August
70% Duration Flow for August
90% Duration Flow for August
100% Duration Flow for August
Stream Bed
CELRL-ED-TH 1998
Drawn By AJS Checked By LJC

PLATE 28

BARREN RIVER - KENTUCKY
ESTIMATED EXISTING CONDITIONS (GREEN RIVER DAM 4 DETERIORATED)

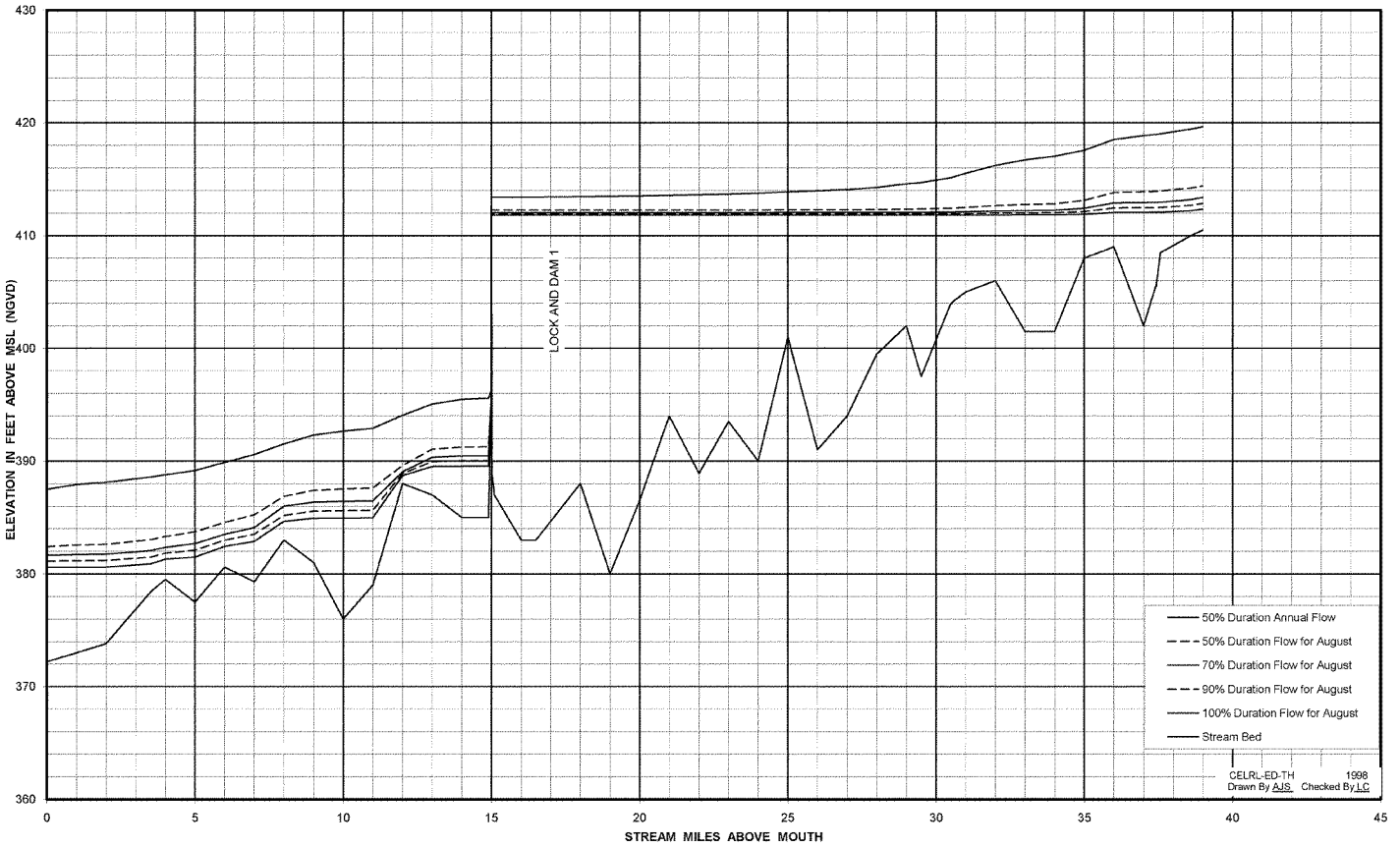


PLATE 29

BARREN RIVER - KENTUCKY
GREEN RIVER DAM 4 DETERIORATED AND BARREN RIVER DAM 1 REMOVED

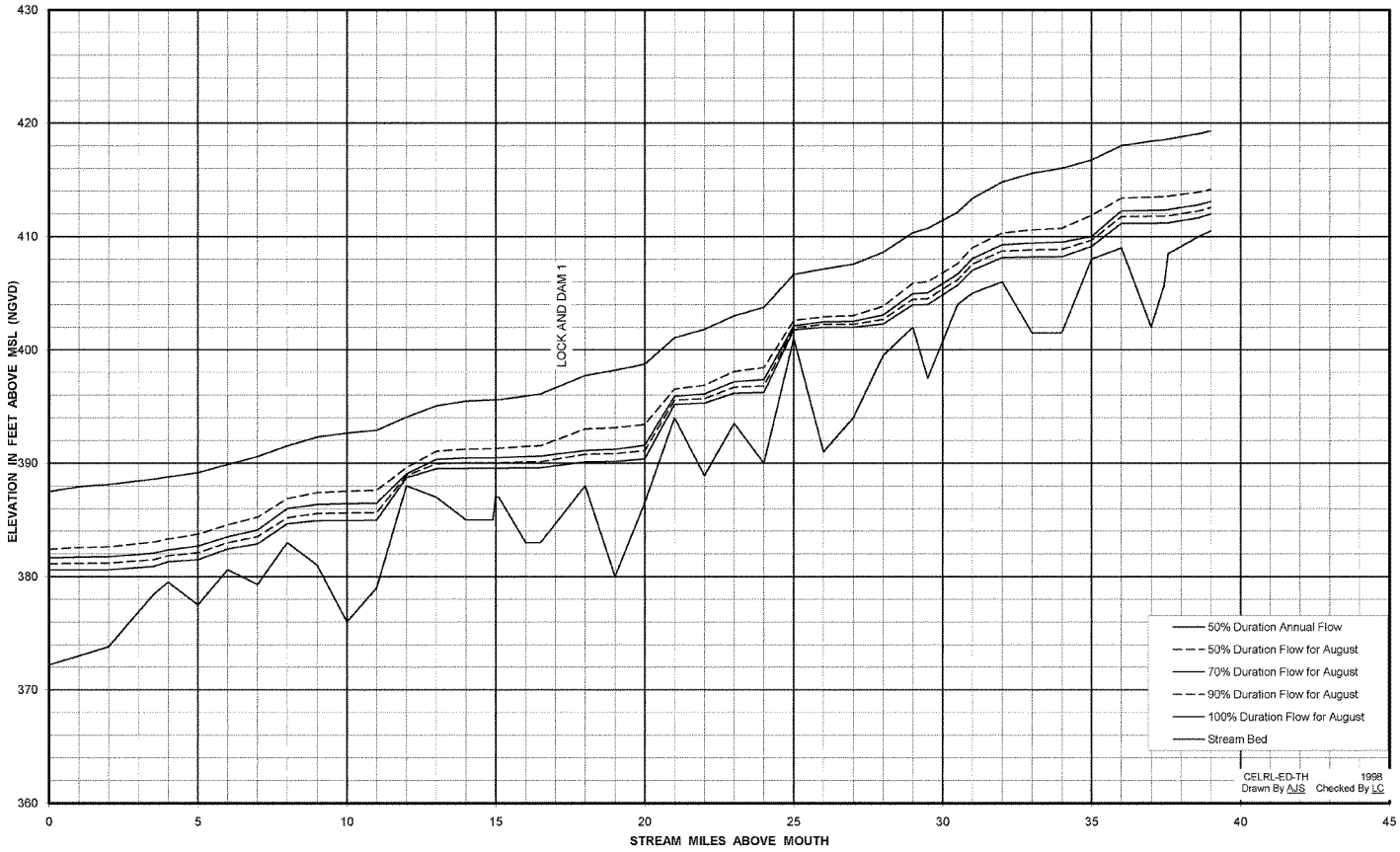


PLATE 30

GREEN RIVER AT BROWNSVILLE - LOCK AND DAM 6

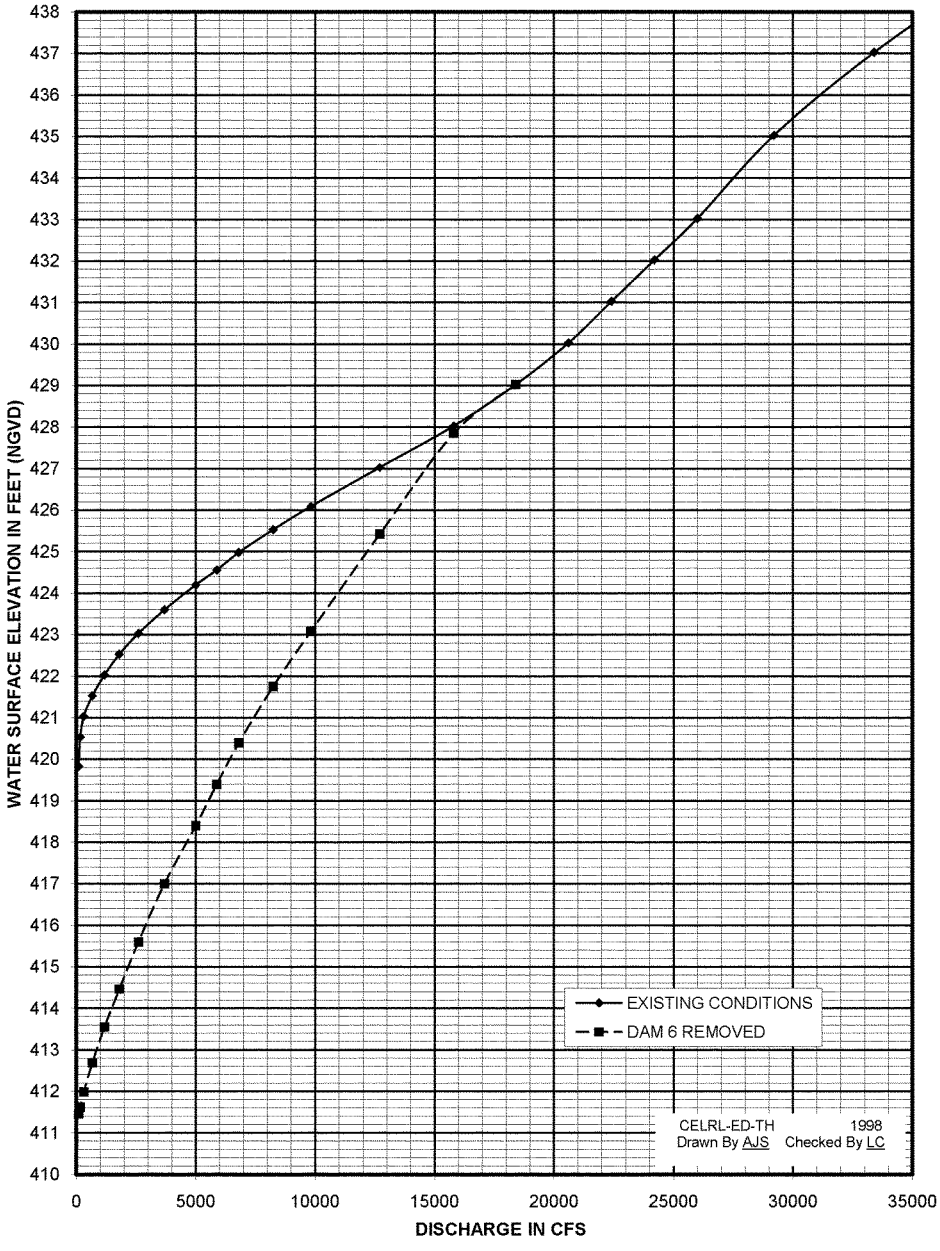


PLATE 31

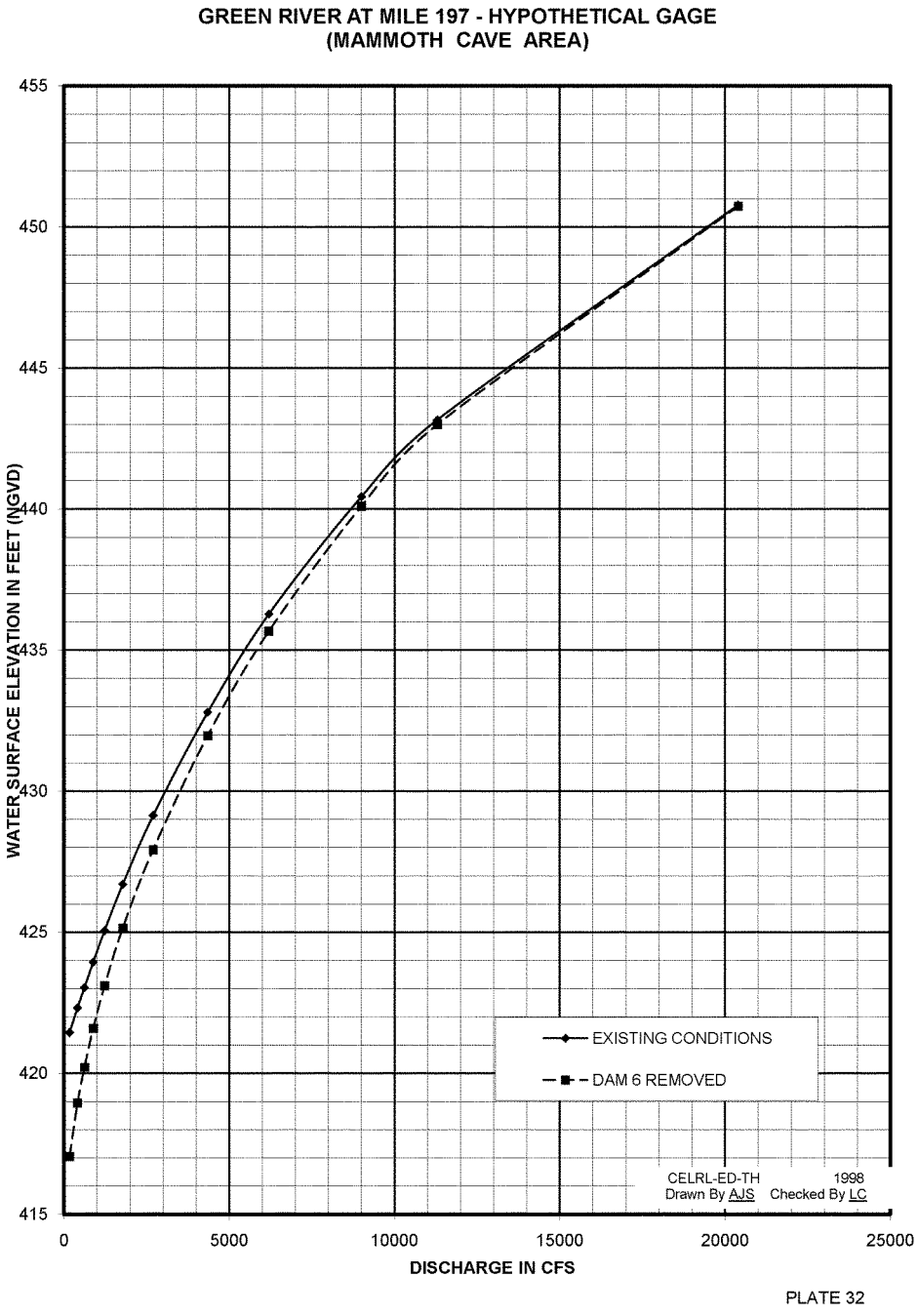
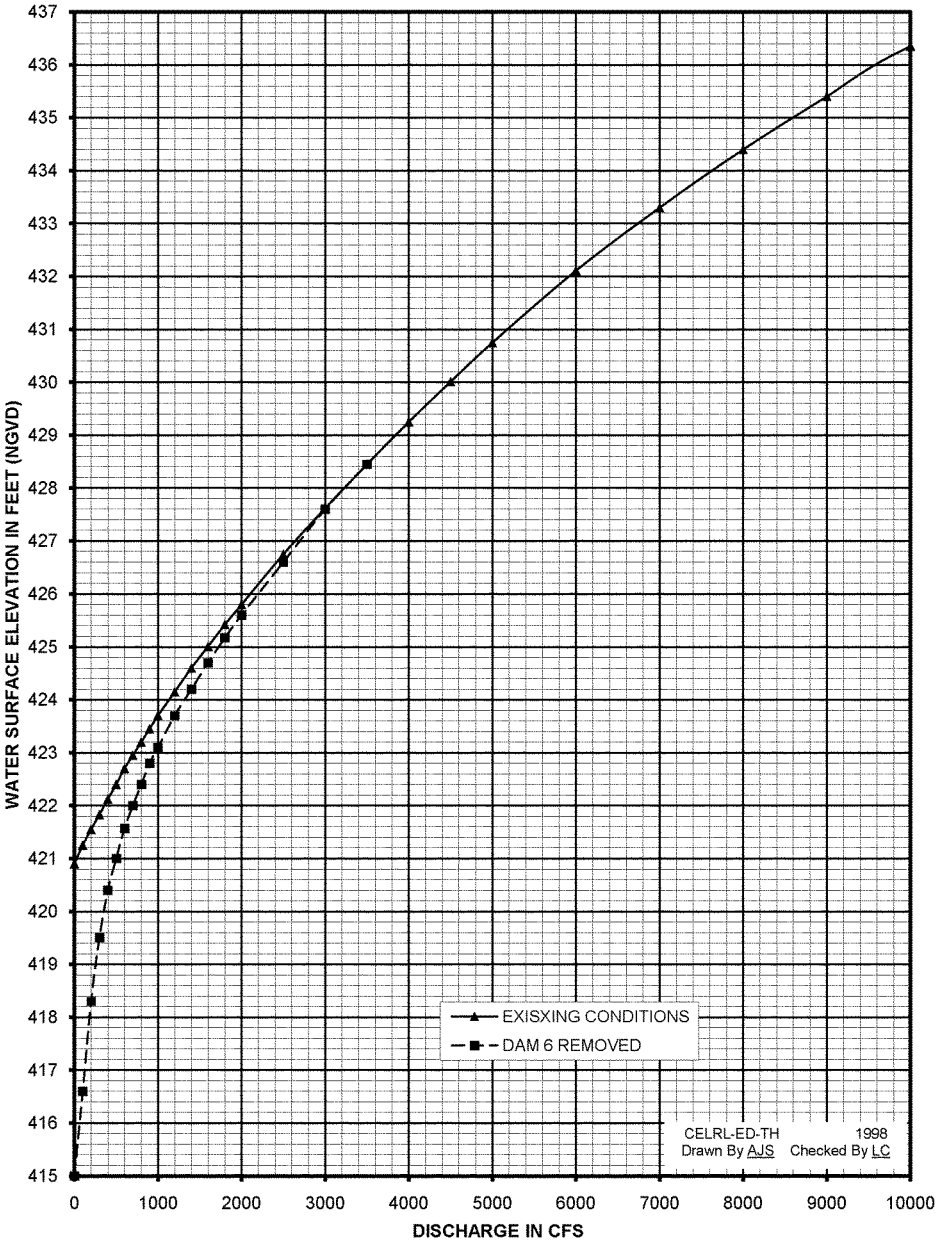

GREEN RIVER AT MILE 197 - HYPOTHETICAL GAGE
(MAMMOTH CAVE AREA)
WATER SURFACE ELEVATION IN FEET (NGVD)
455
450
445
440
435
430
425
420
415
0
5000
10000
15000
20000
25000
DISCHARGE IN CFS
EXISTING CONDITIONS
DAM 6 REMOVED
CELRL-ED-TH 1998
Drawn By AJS Checked By LC

PLATE 32

NOLIN RIVER AT KYROCK



GREEN RIVER AT BROWNSVILLE - LOCK AND DAM 6
ELEVATION DURATION

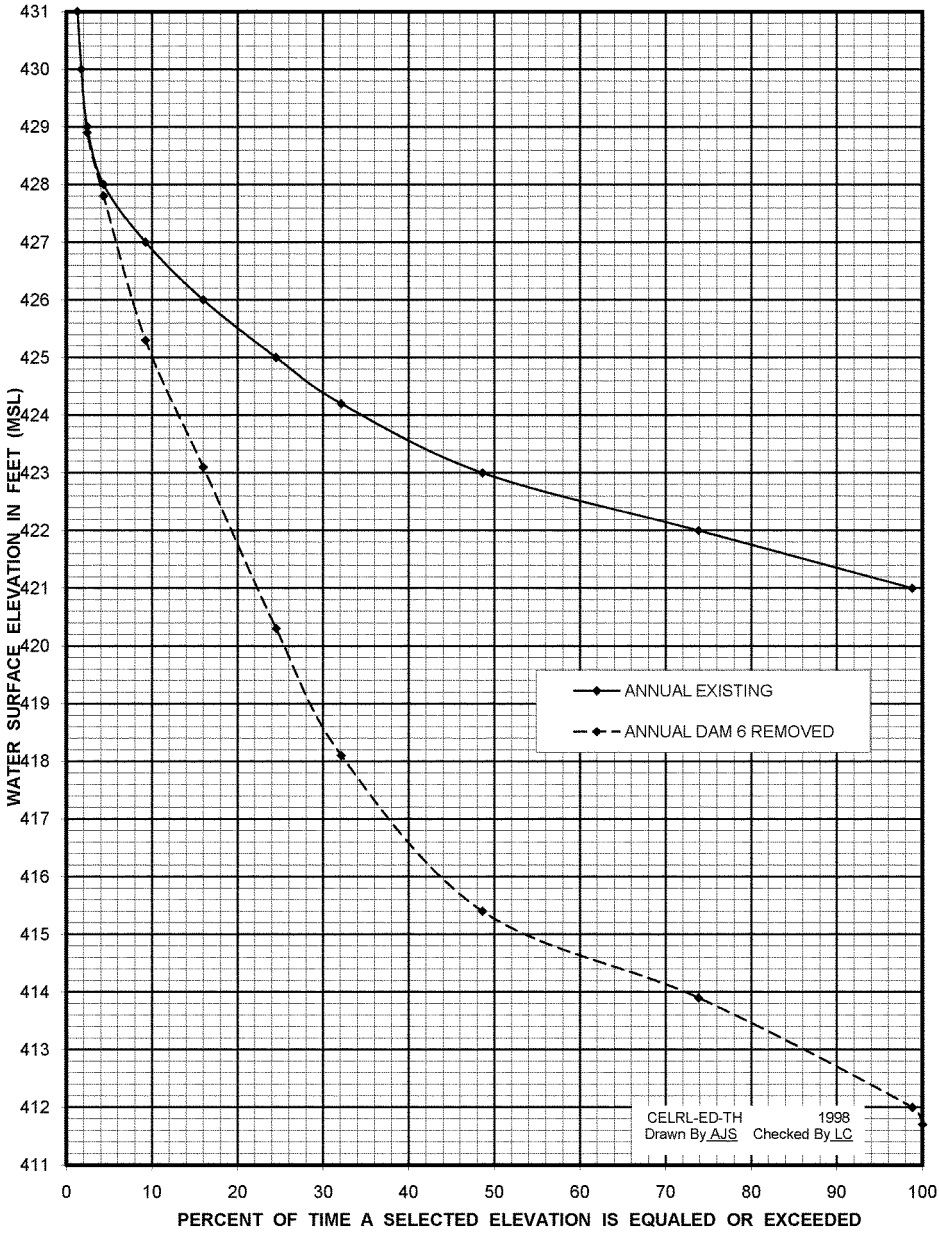


PLATE 34

GREEN RIVER AT MILE 197 - HYPOTHETICAL GAGE
ELEVATION DURATION - (MAMMOTH CAVE AREA)

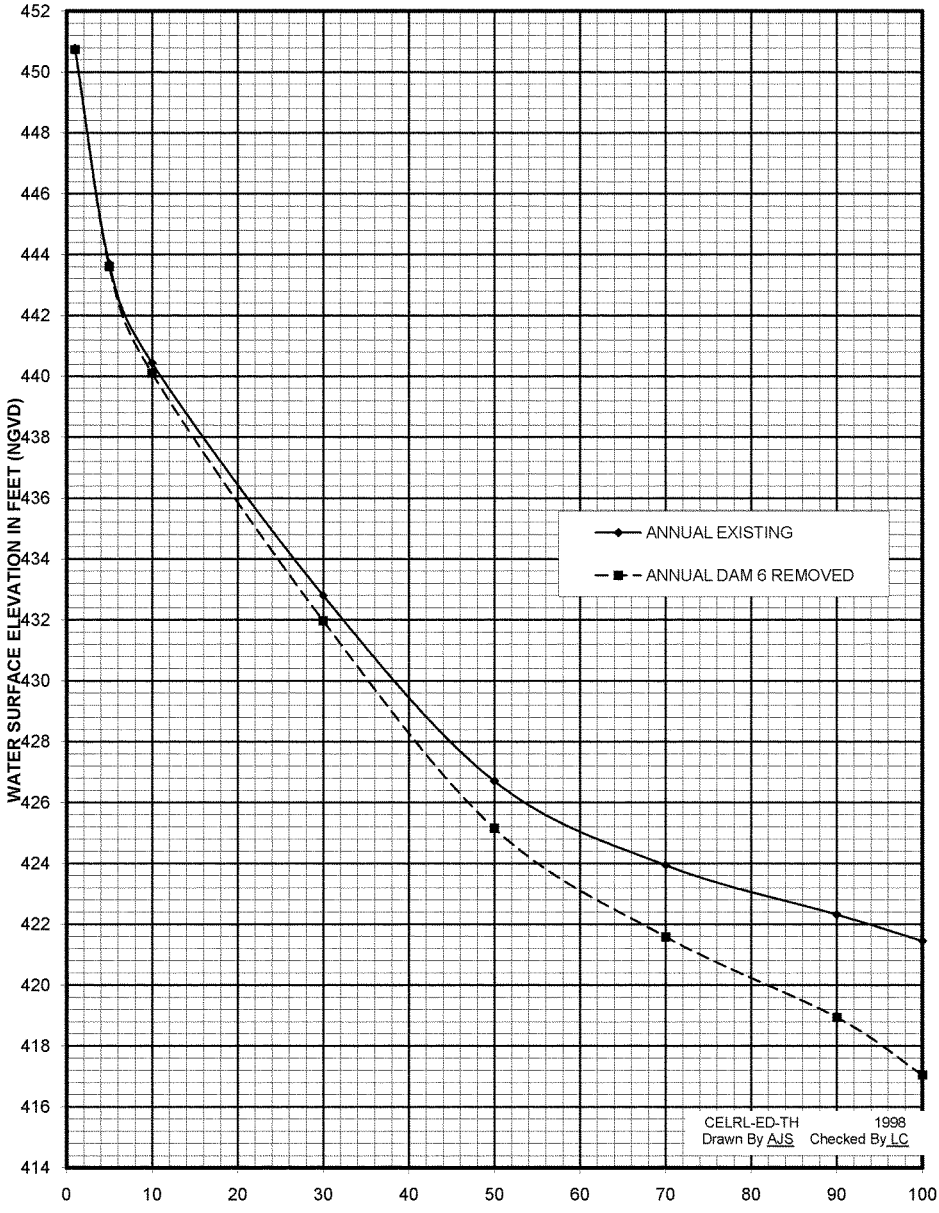
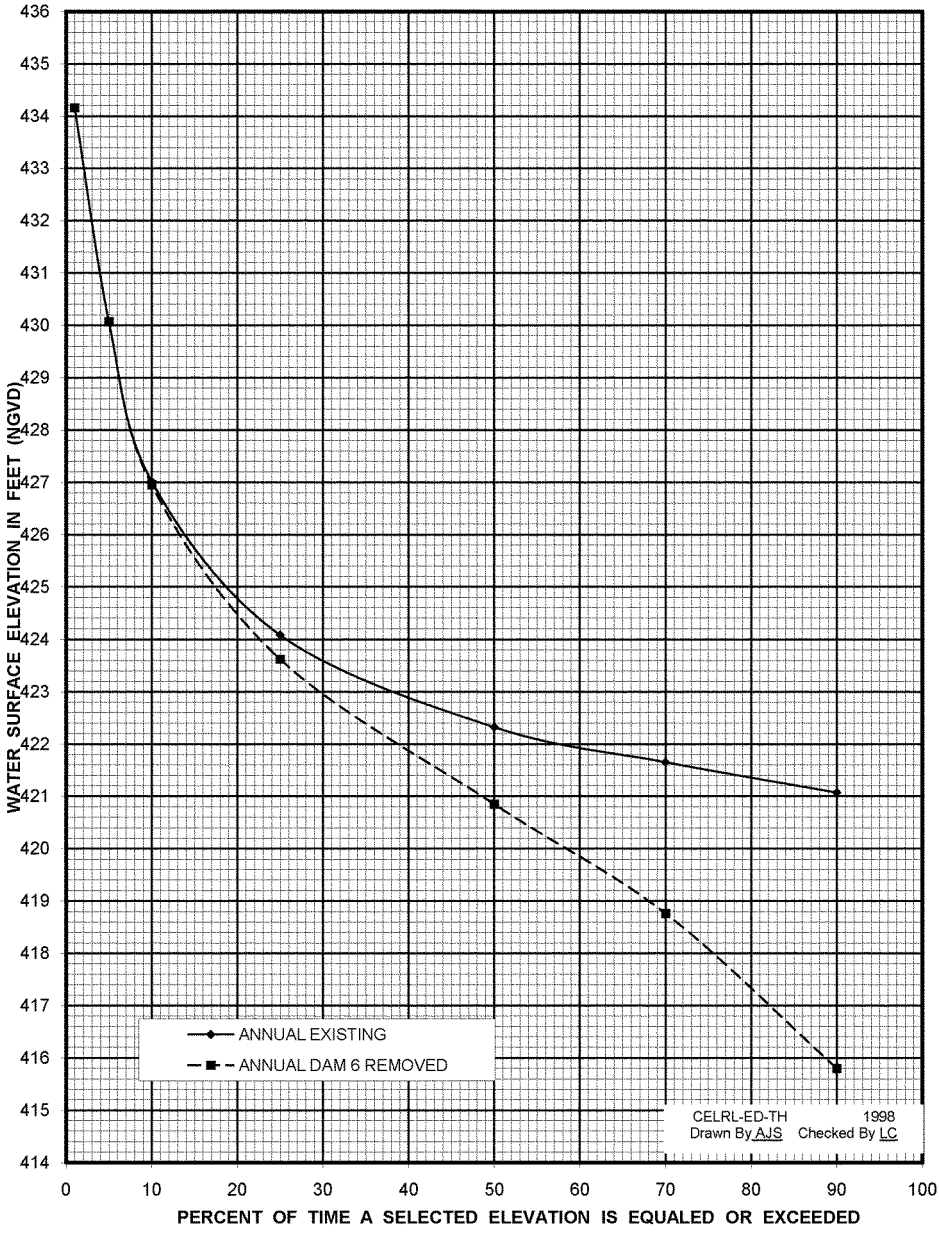


PLATE 35

NOILN RIVER AT KYROCK, KENTUCKY
ELEVATION DURATION



GREEN RIVER AT MUNFORDVILLE, KENTUCKY
DISCHARGE DURATION

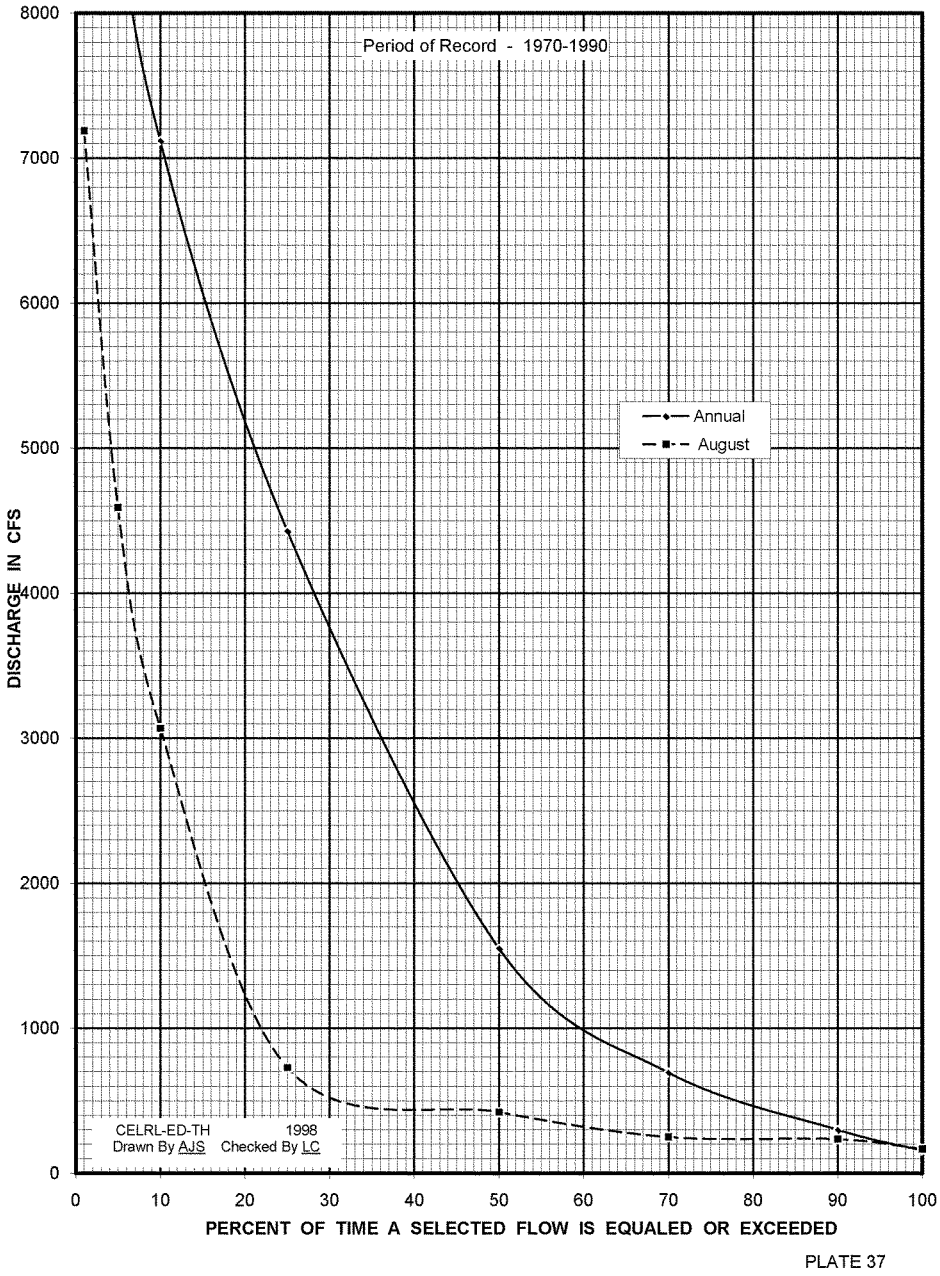


PLATE 37

NOILN RIVER AT KYROCK, KENTUCKY
DISCHARGE DURATION

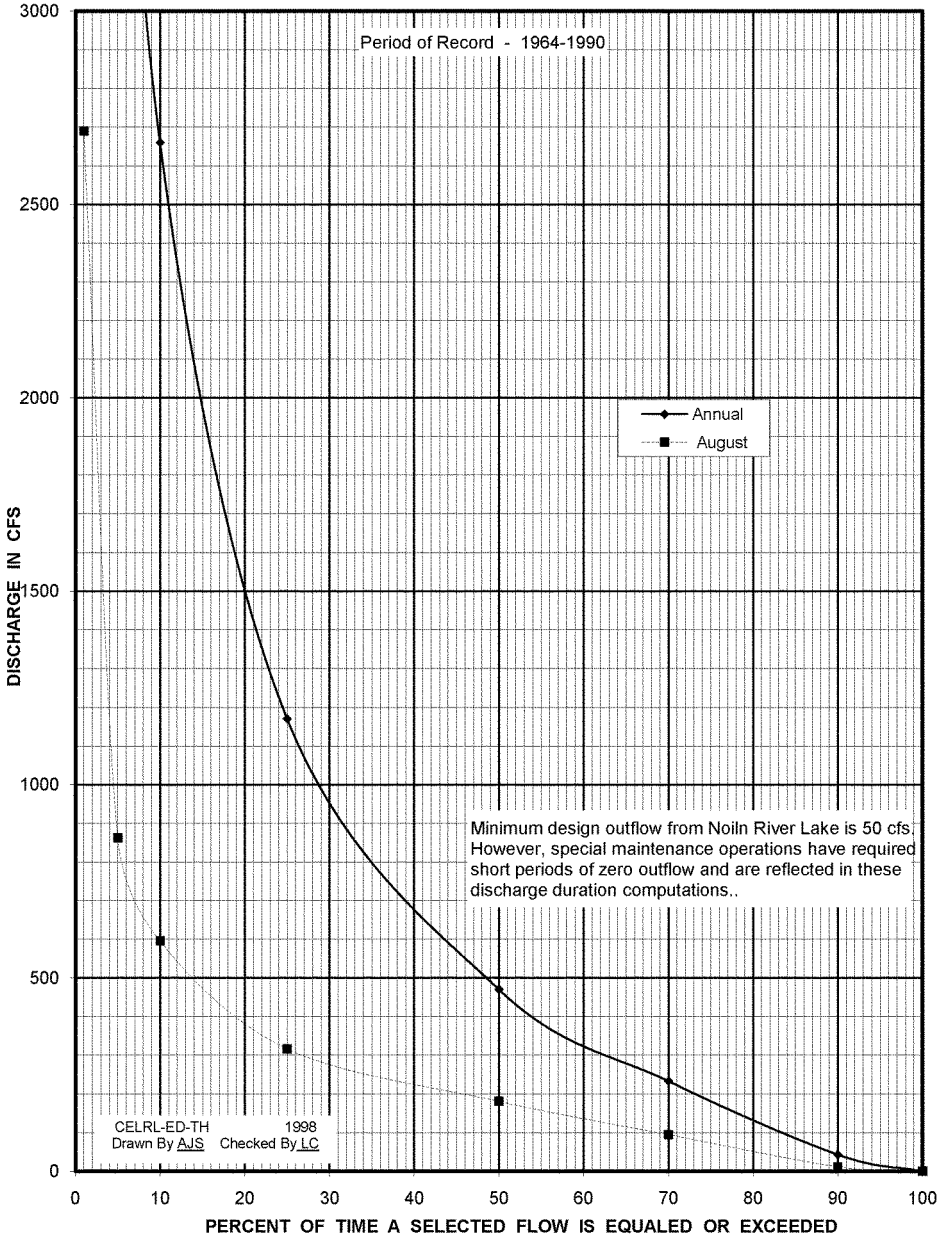


PLATE 38

GREEN RIVER AT BROWNSVILLE - LOCK 6, KENTUCKY
DISCHARGE DURATION

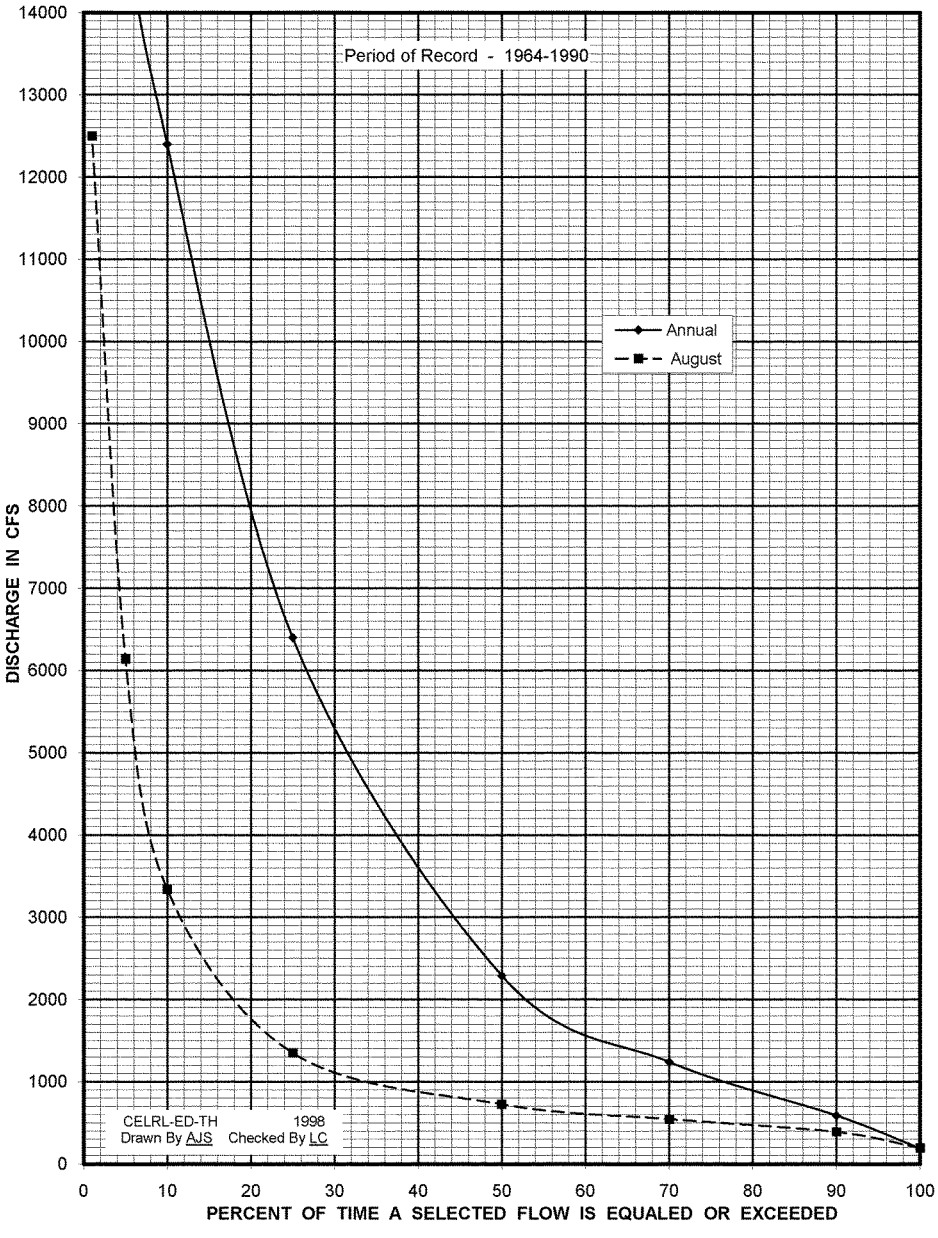


PLATE 39

BARREN RIVER AT BOWLING GREEN, KENTUCKY
DISCHARGE DURATION

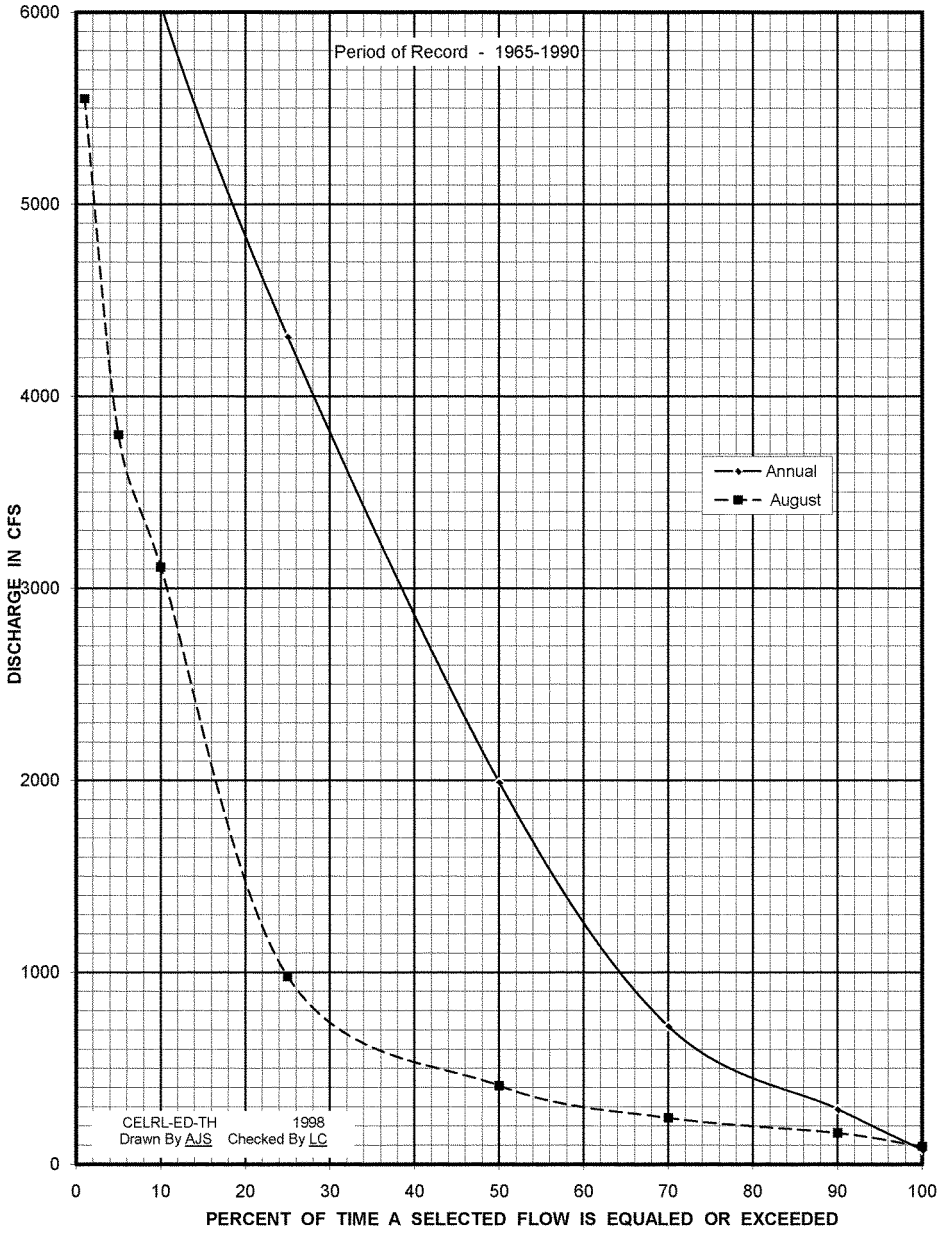


PLATE 40

GREEN RIVER AT WOODBURY - LOCK 4, KENTUCKY
DISCHARGE DURATION

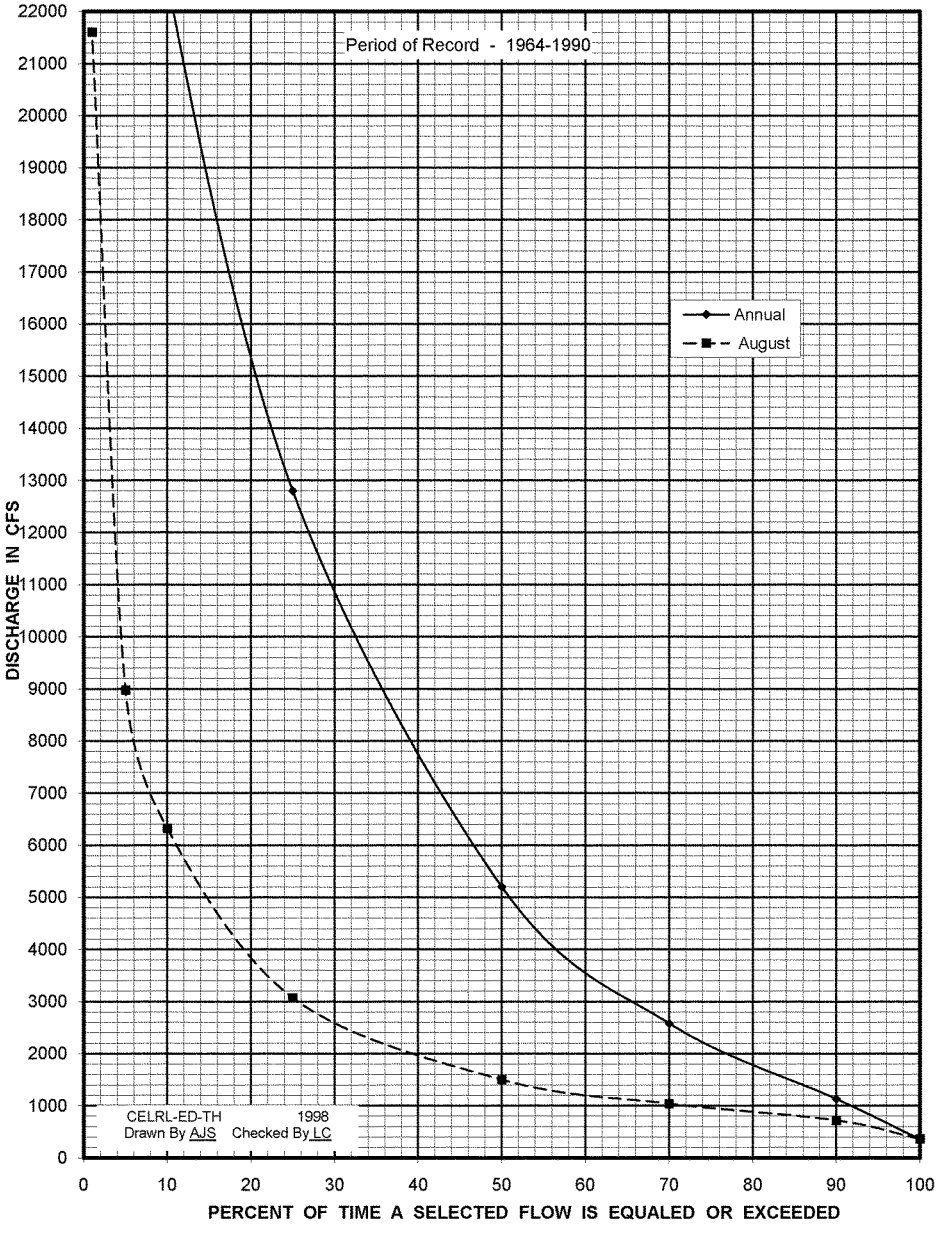


PLATE 41

GREEN RIVER AT CALHOUN - LOCK 2, KENTUCKY
DISCHARGE DURATION

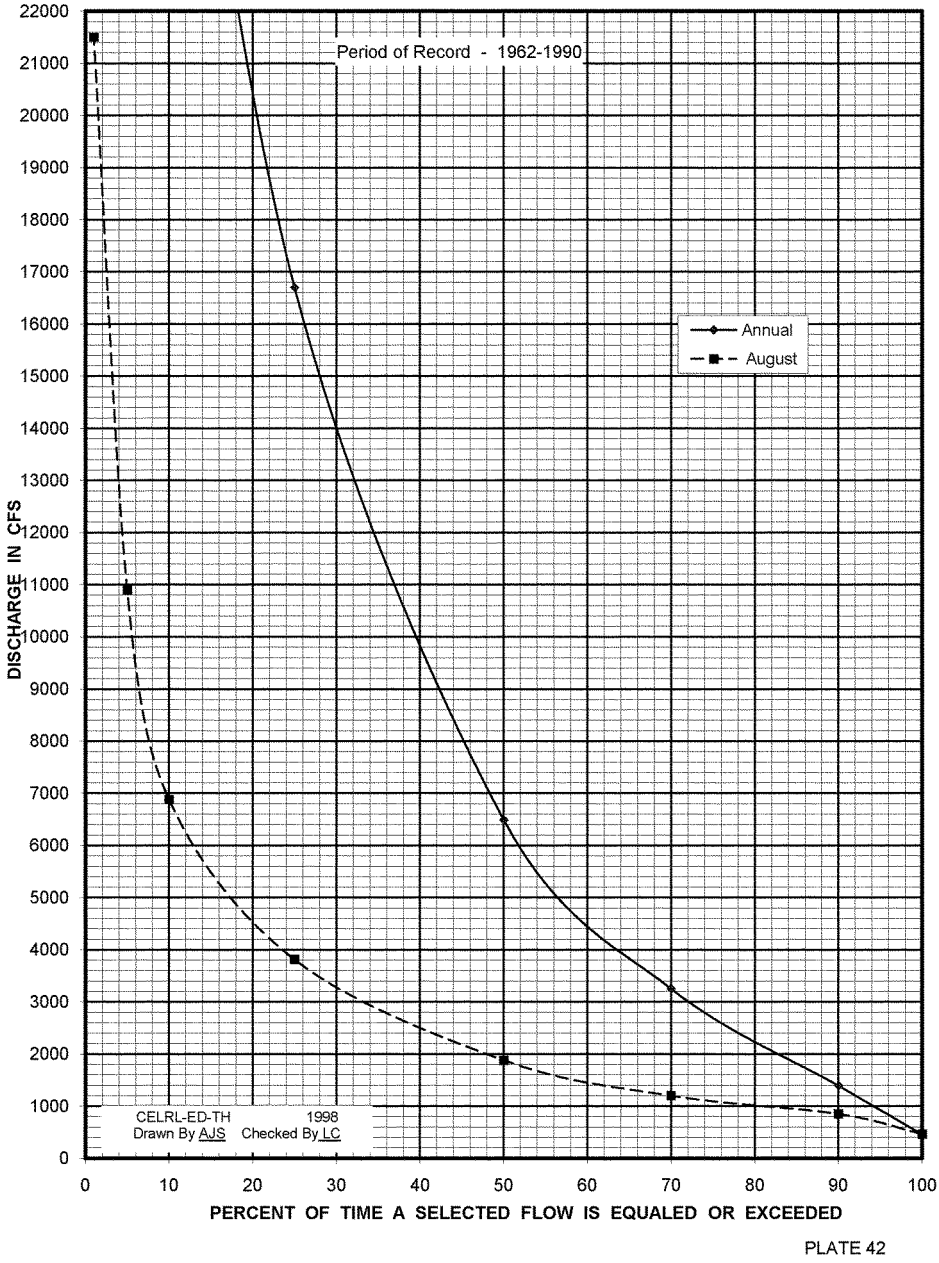
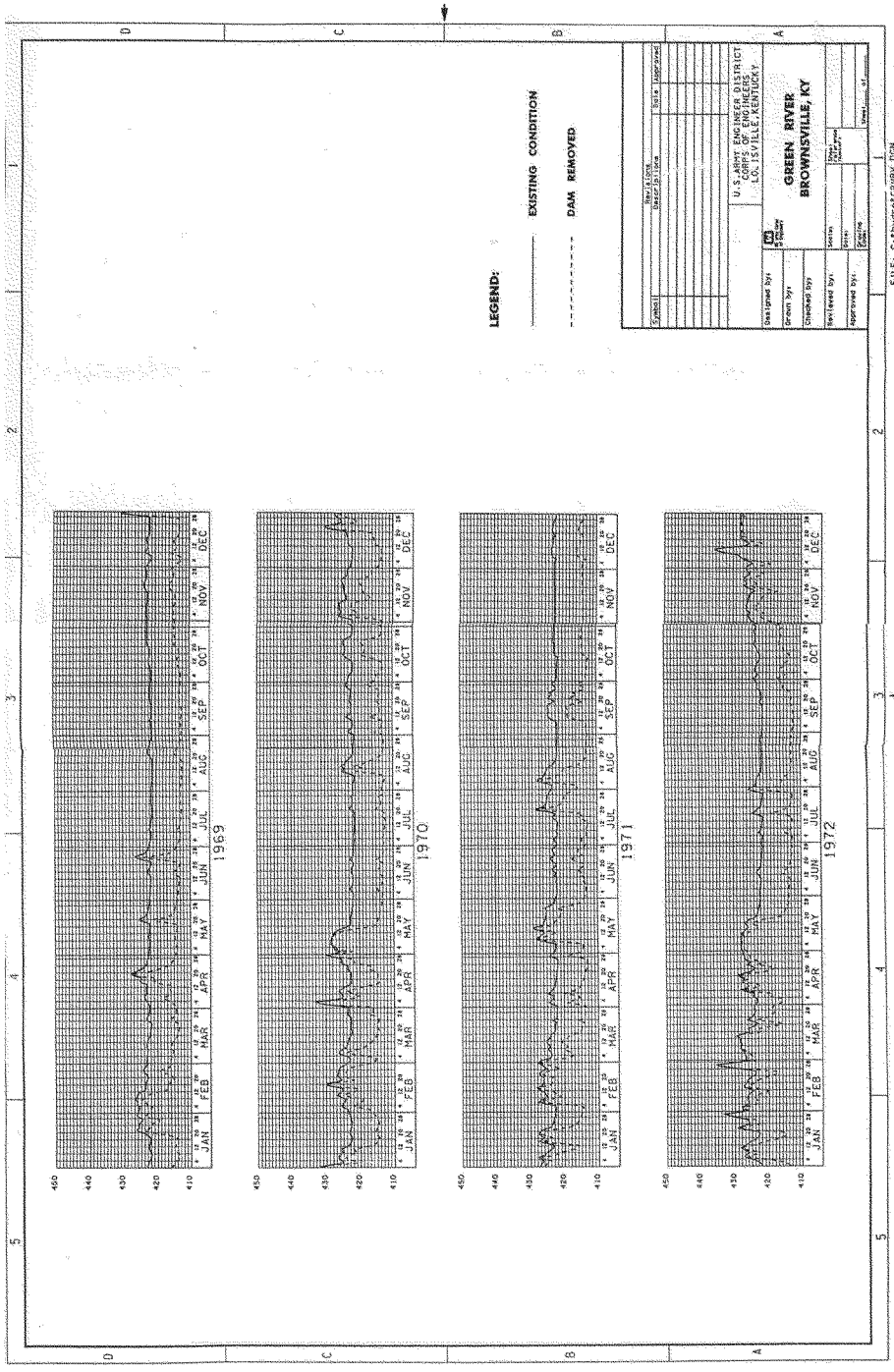
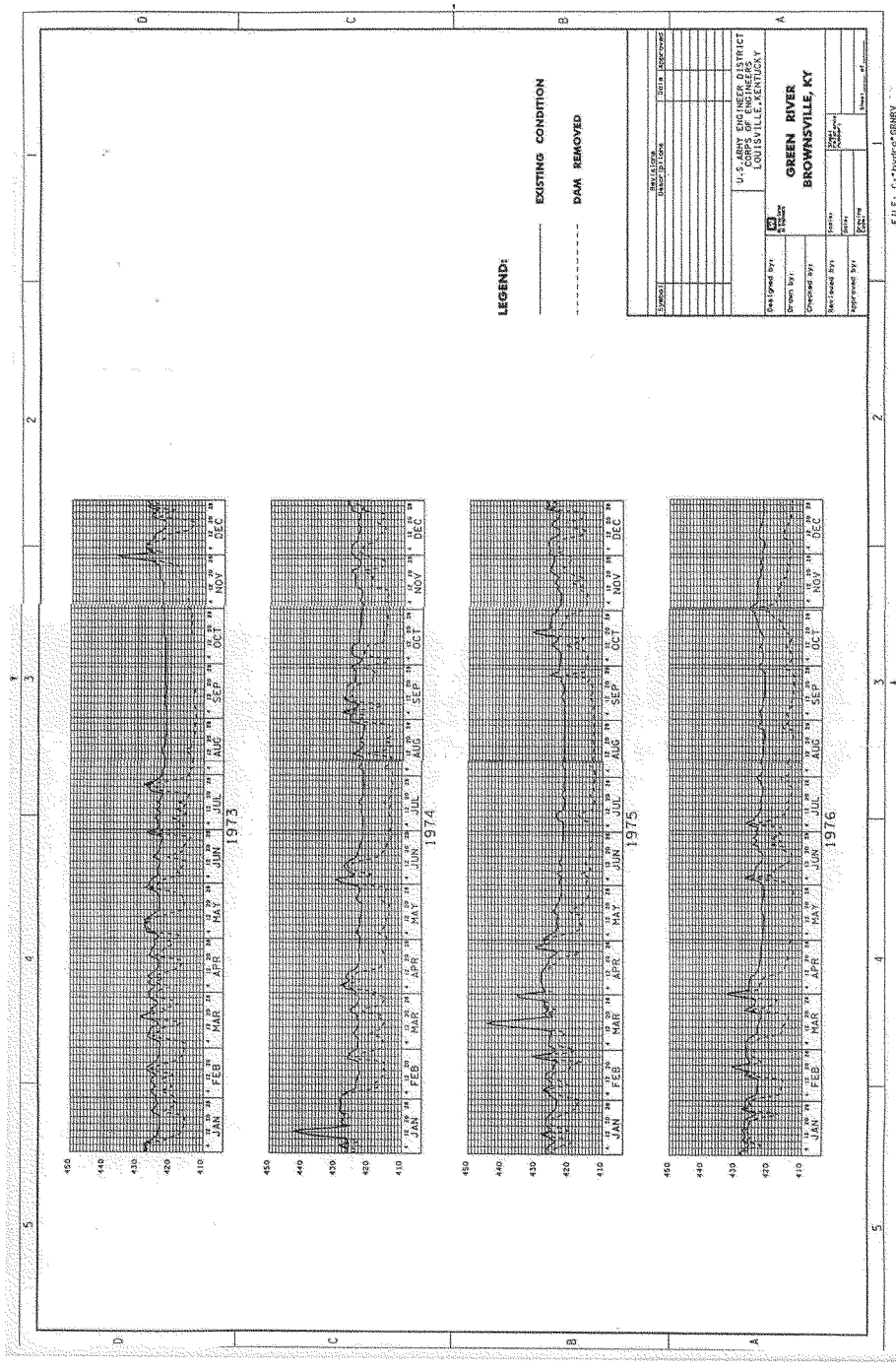
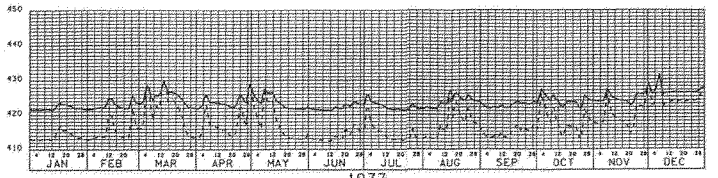


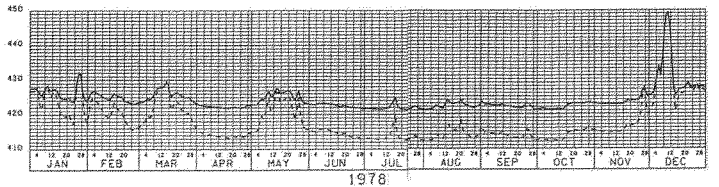
PLATE 42


LEGEND:
EXISTING CONDITION
DAM REMOVED
1969
1970
1971
1972
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY
GREEN RIVER
BROWNSVILLE, KY
PLATE 43

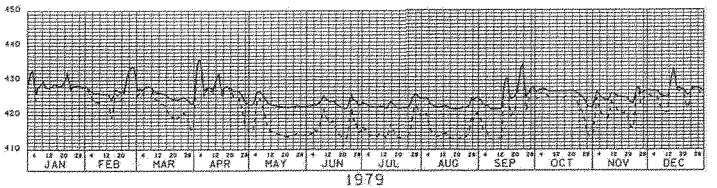

LEGEND:
EXISTING CONDITION
DAM REMOVED
1973
1974
1975
1976
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY
GREEN RIVER
BROWNSVILLE, KY
PLATE 44



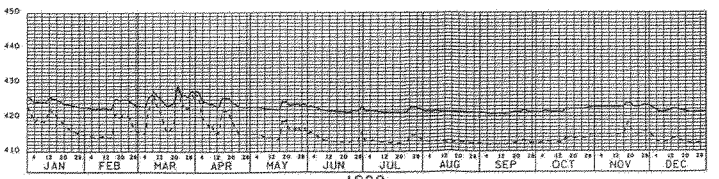
1977



1978



1979



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GREEN RIVER
BROWNSVILLE, KY

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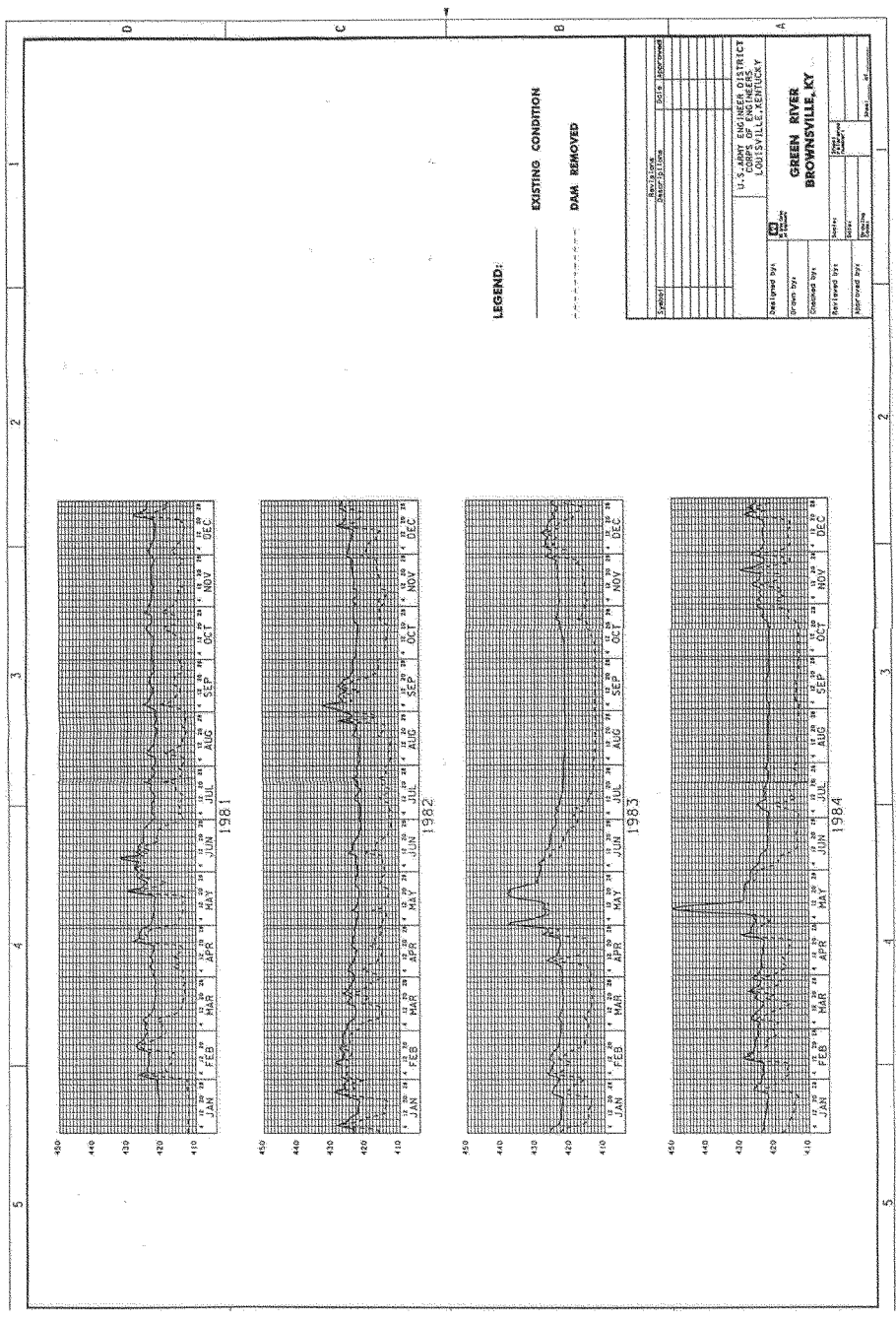
PLATE 45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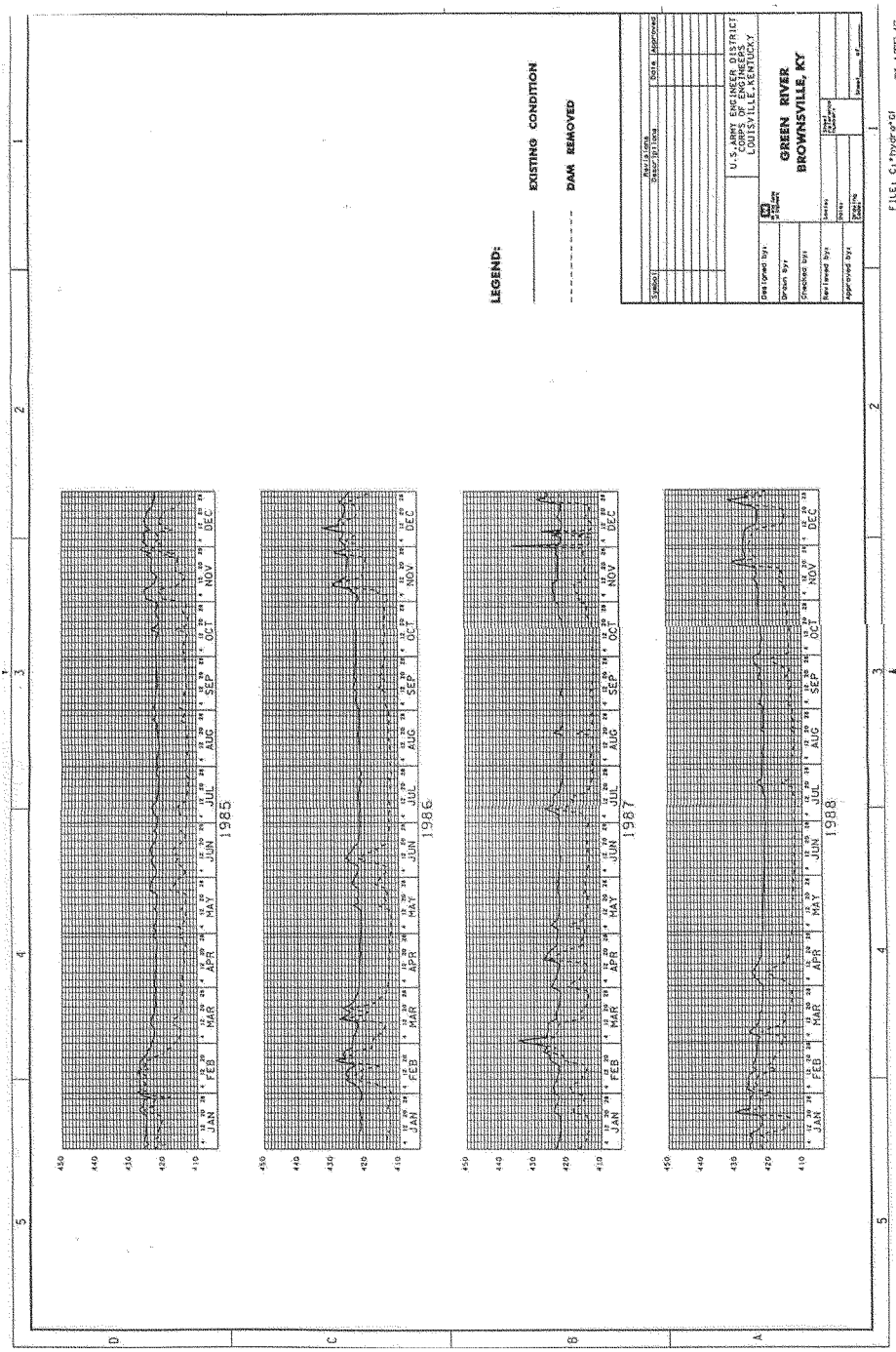
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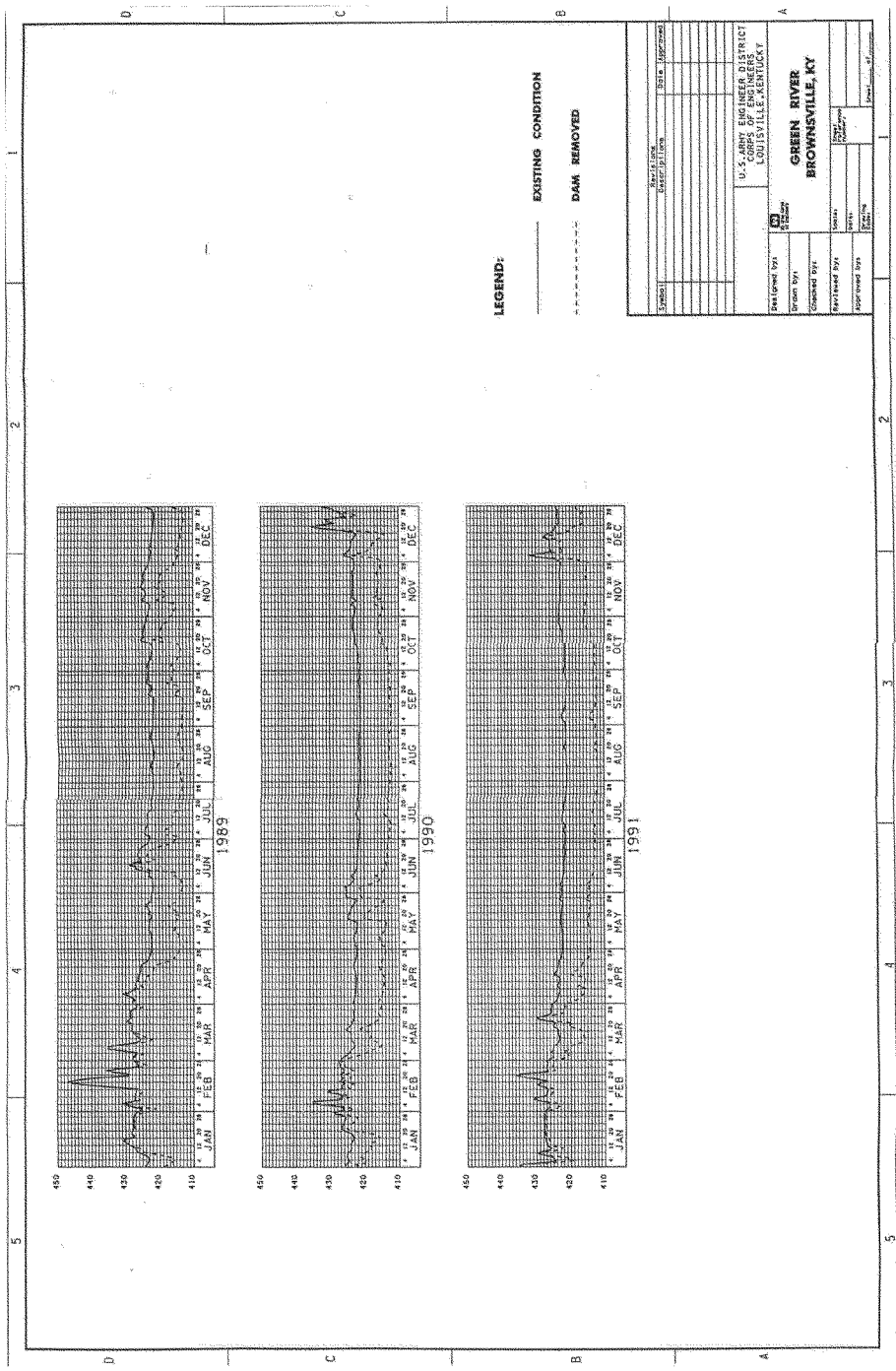
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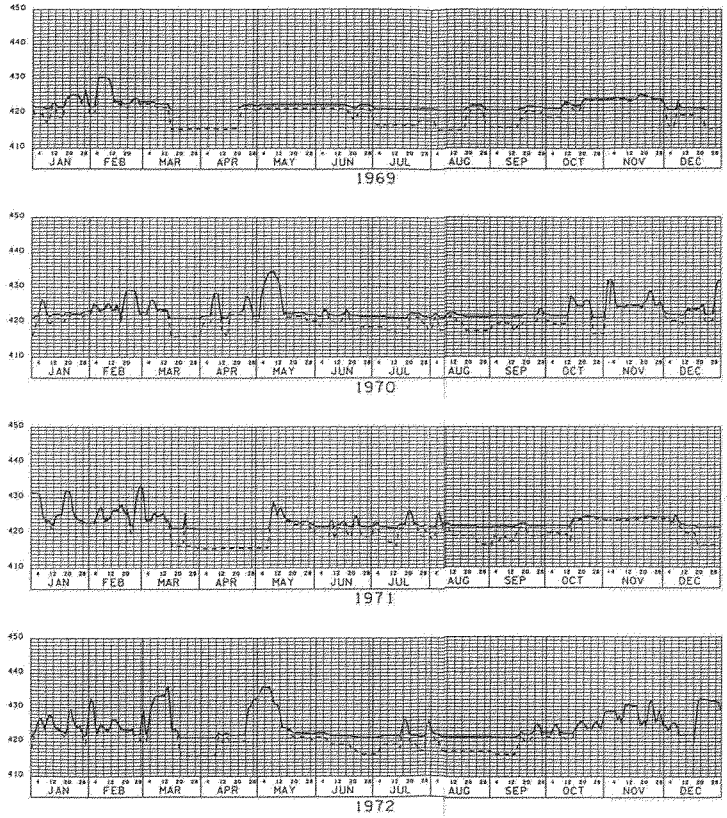

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KYROCK, KY

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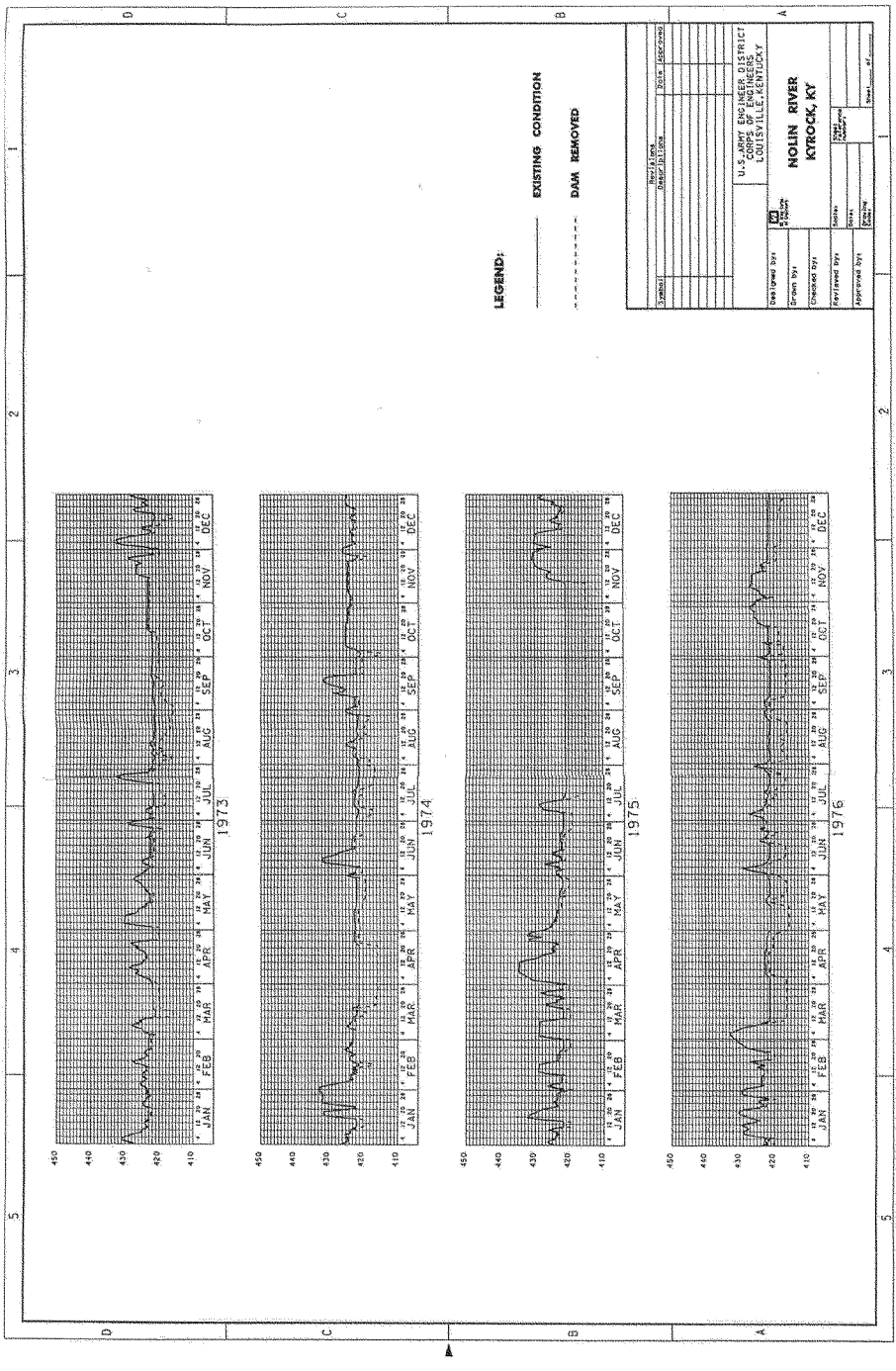
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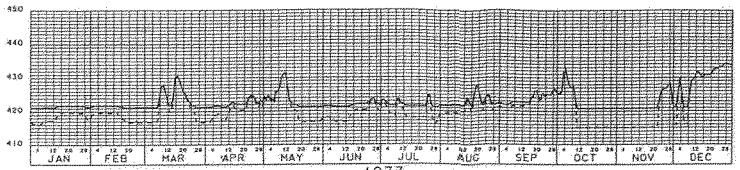

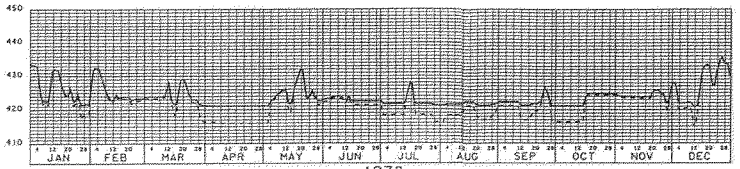

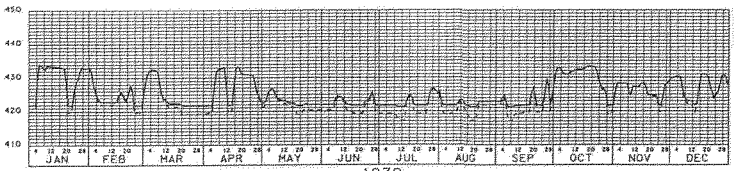

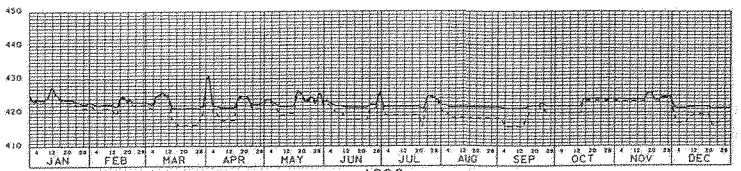

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KYROCK, KY

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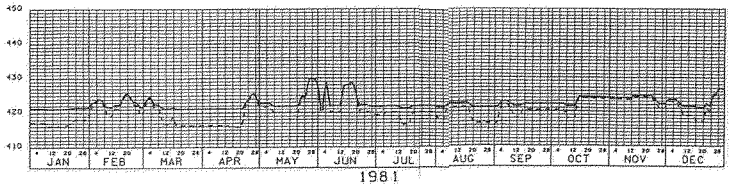

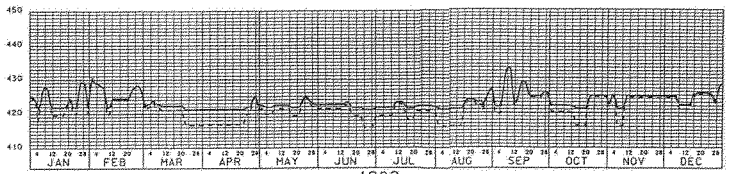

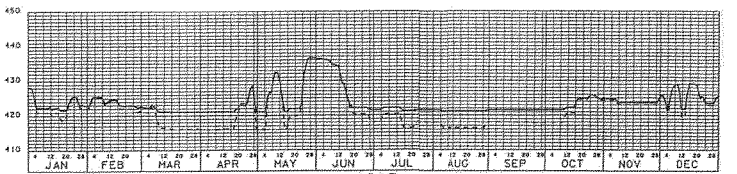

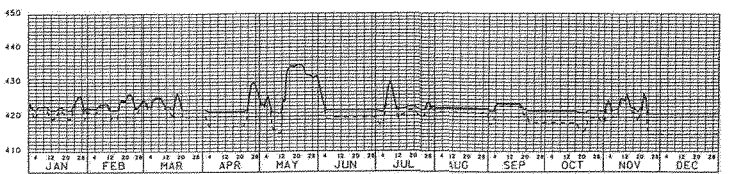

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KYROCK, KY

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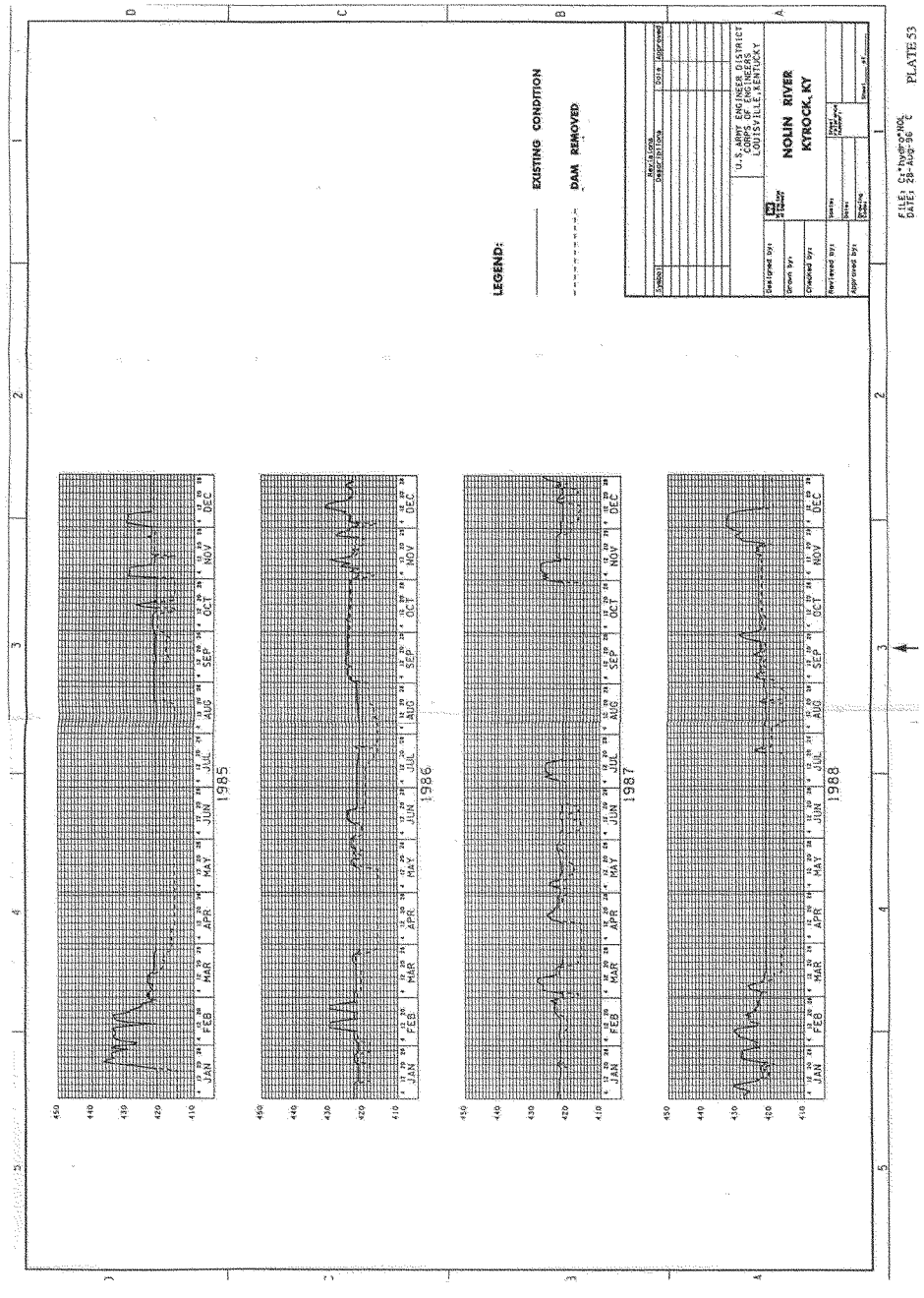
PLATE 52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KYROCK, KY
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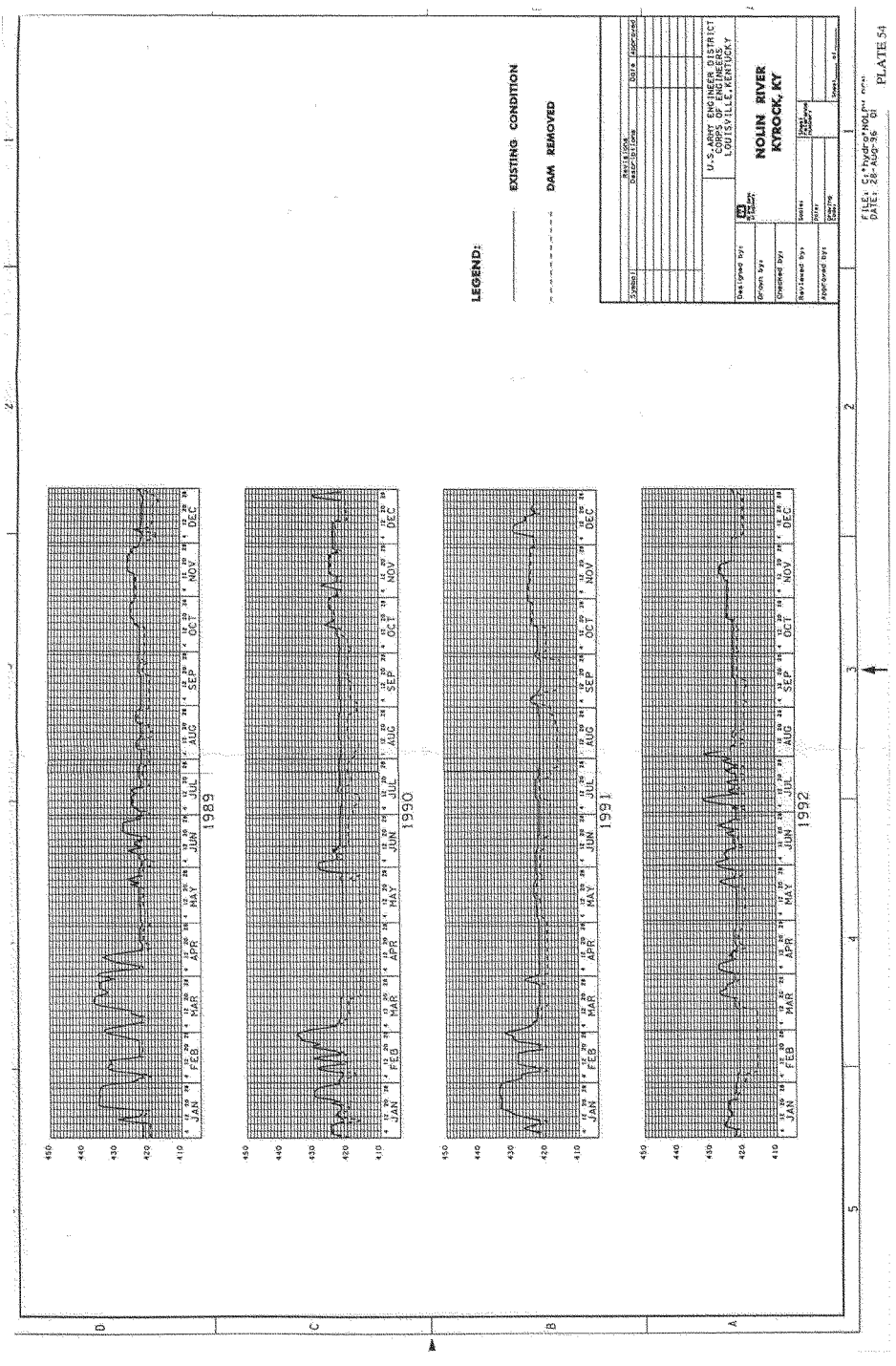
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LOUISVILLE, KENTUCKY
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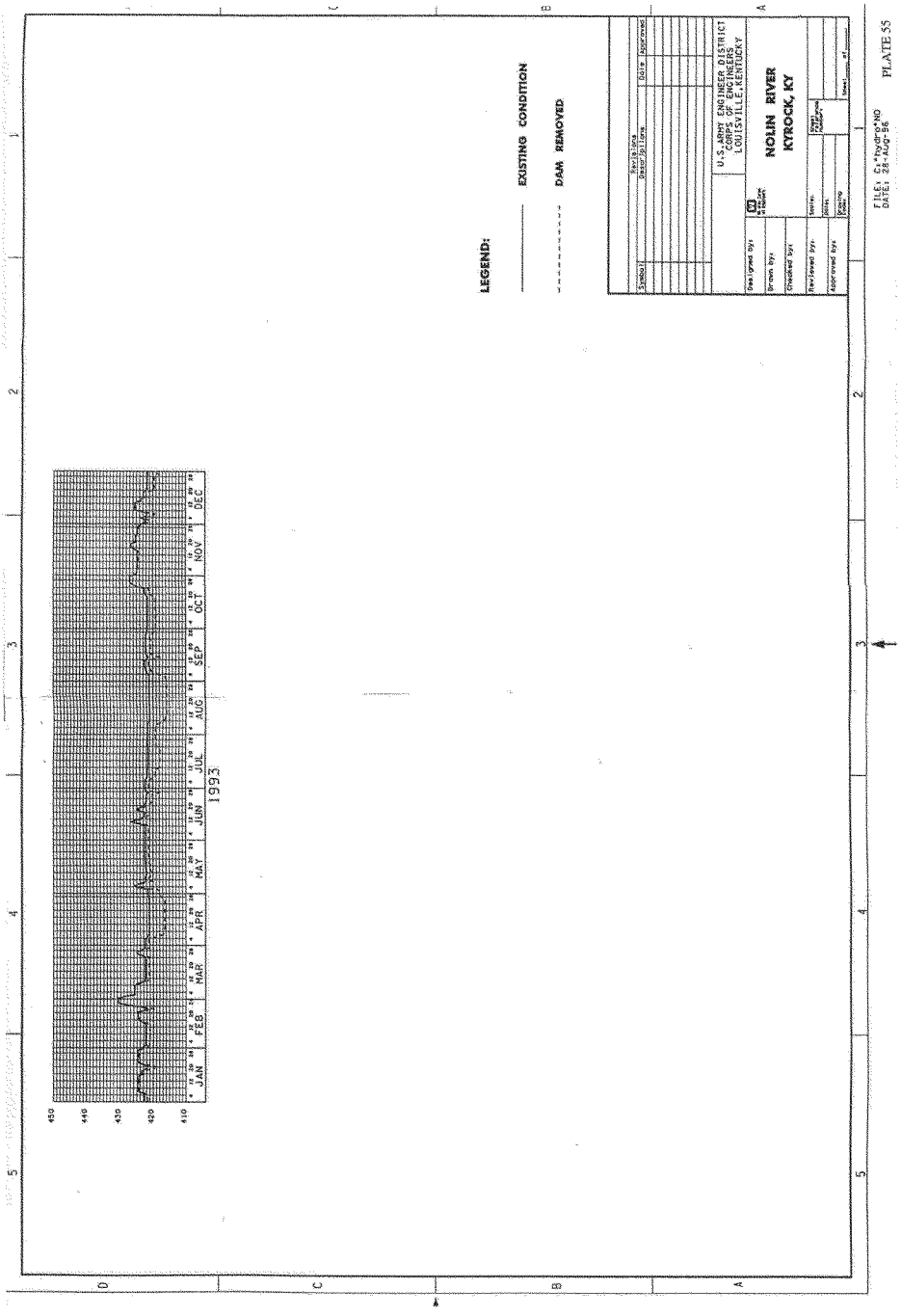
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PLATE 55

Appendix D:
Environmental Assessment

US Army Corps
of Engineers
Louisville District

Environmental Assessment for the Disposition of Green River Lock and Dam Nos. 3, 4, 5, 6 and Barren River Lock and Dam No. 1



Prepared by:
U.S. Army Corps of Engineers, Louisville District
May 2014

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1.0 INTRODUCTION

The facilities at Green River Lock and Dam Nos. 3 through 6, and Barren River Lock and Dam No. 1 (figures 1 through 5) in west central Kentucky were authorized solely for the purpose of navigation, but are no longer being operated. Decline in commercial navigation and continued deterioration at the facilities led to the failure of Green River Dam No. 4 and loss of the navigation pool in 1965. All navigation upstream of Green River Lock and Dam No. 3 was discontinued with its closure in 1981.

The Louisville District, U.S. Army Corps of Engineers (USACE), completed a study in 1993 that analyzed the feasibility of facility improvements along the Green and Barren rivers. The study concluded that there were insufficient economic benefits from commercial navigation to support any improvements. The USACE is currently considering deauthorization and disposal of Federal interests in the facilities at Green River Lock and Dam Nos. 3 through 6, and Barren River Lock and Dam No. 1. As required by the National Environmental Policy Act (NEPA), the USACE is evaluating the impacts associated with several alternatives of disposal. This Environmental Assessment (EA) evaluates environmental impacts associated with all alternatives, including the No-Action Alternative.

1.1 Description of the Proposed Action

The proposed action is Congressional deauthorization of the commercial navigation purpose of the lock and dam facilities described below, construction or modification of those facilities and, ultimately, disposal of the facilities and associated Federally owned properties. Specifically, the following properties are included in the Proposed Action:

Green River Lock and Dam No. 3

Located at Green River Mile 108.5 near Rochester in Ohio and Muhlenberg Counties, Kentucky, this lock was closed to navigation in September 1981 due to the decline in commercial navigation. Land owned by the Federal Government at Green River Lock and Dam No. 3 includes 4.99 acres in Muhlenberg County, and 6.72 acres located in Ohio County. Improvements at the site include a gravel parking lot on the left descending bank, and remains of a brick dwelling and two metal sheds.

Green River Lock and Dam No. 4

Located at Green River Mile 149.0 at Woodbury, Butler County, Kentucky this lock and dam was closed to navigation when the dam failed on May 24, 1965, resulting in the loss of the majority of the pool; however, because some of the dam remains, some pooling still occurs here. Land owned by the

Federal Government at this site includes 0.01 acres in Butler County, which supports a USGS gauging station.

Green River Lock and Dam No. 5

Located at Green River Mile 168.1 in Butler County, Kentucky, near the Hart County line, operation of this lock and dam ceased on August 31, 1951 due to the decline in commercial navigation. Land owned by the Federal Government at Green River Lock and Dam No. 5 includes 27.064 acres along the right descending bank in Butler County, and 5.21 acres along the left descending bank in Warren County. Remains of old structures (sidewalks, remnant structures, stairs, etc.) are evident on-site. Remaining structures at this site include the old operations control house.

Green River Lock and Dam No. 6

Located at Green River Mile 181.7 near Brownsville, Edmonson County, Kentucky, operation of this lock and dam ceased on August 31, 1951. Land owned by the Federal government at Green River Lock and Dam No. 6 includes 18 acres along the right descending bank, and 4.19 acres along the left descending bank, both in Edmonson County. Remaining improvements to the site consist of a USGS gauging station located on the right descending bank.

Barren River Lock and Dam No. 1

Located at Barren River Mile 15.0 near Richardsville, Warren County, Kentucky, this lock was closed to navigation as a result of the loss of the lower pool associated with the failure of Green River Dam No. 4. Land owned by the Federal government at this site includes 16.63 acres along the right descending bank only. The only structure remaining aside from the lock and associated structures is the operations control house.

1.2 Purpose and Need

The purpose of the project is to deauthorize, modify as appropriate and dispose of the Federal interest at Green River Lock and Dam Nos. 3, 4, 5, and 6 and Barren River Lock and Dam No. 1. The need for disposition is due to the absence of any continued use of the facilities for their authorized purpose (i.e., navigation). This study also supports the objectives of the 10 June 2010 Presidential Memorandum 'Disposing of Unneeded Federal Real Estate'. This EA evaluates the impacts associated with the action alternatives and the No-Action Alternative as they may relate to the above referenced locks and dams.

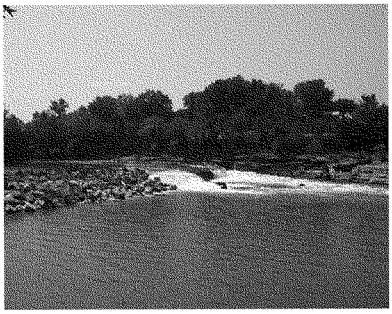


Figure 1a. Green River Dam No. 3 (2011)

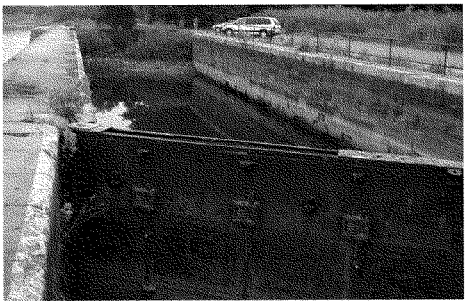


Figure 1b. Green River Lock No. 3 (2011)

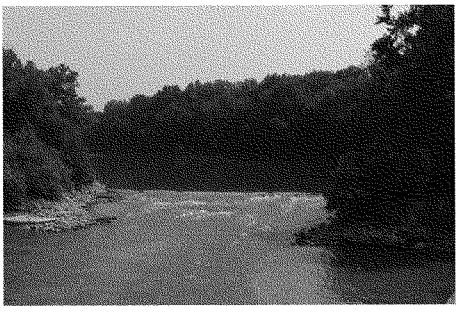


Figure 2a. Breached Green River Dam No. 4 (2011)

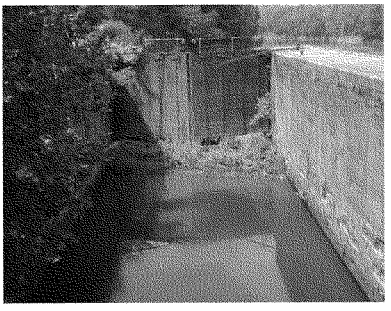


Figure 2b. Green River Lock No. 4 (2011)

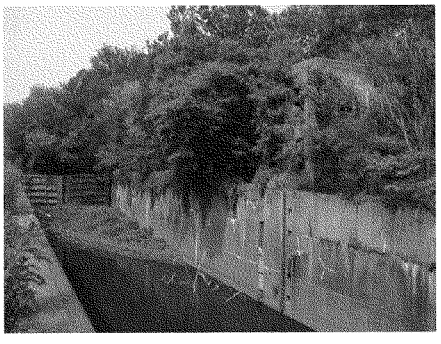


Figure 3a. Green River Lock No. 5 (2011)

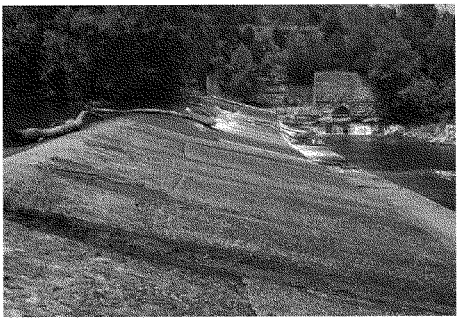


Figure 3b. Green River Dam No. 5 (2013)

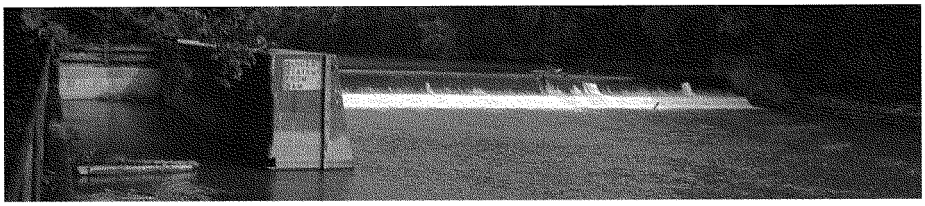


Figure 4. Green River Lock and Dam No. 6 (2011)



Figure 5a. Barren River Lock No. 1 (2011)

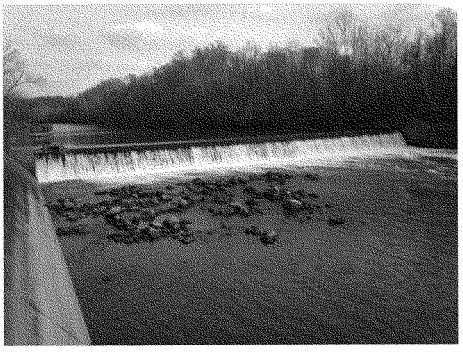


Figure 5b. Barren River Dam No. 1 (2011)

2.0 ALTERNATIVES

Existing conditions vary at each of the lock and dam sites due to factors including, but not limited to: age, physical condition of the structures, and plant growth and sediment build-up in and around the structures. Because of this site-to-site variation, each lock and dam was essentially evaluated as a standalone project and the preferred alternatives differ between sites.

2.1 Alternative 1 (No Action)

With this alternative, the lock and dam would remain in Federal ownership with caretaker status - a nonoperating condition in which the facilities are in a care and limited preservation status. The Louisville District's Operations Division would remain responsible for these facilities. At present, the District spends approximately $10,000 per year for all of the sites to inspect the properties and maintain signage. While unauthorized entry is prohibited, there is ample evidence that the sites are frequently used, even those that are relatively remote. With a "no action" alternative, trespassing would likely remain an issue.

A "no action" alternative would mean that the Federal government would retain ownership and responsibility for the properties. No alterations would be done to the facilities. The District would continue in caretaker status, maintaining signage, and periodically inspecting the properties.

2.2 Alternative 2 (Disposal of Federal Ownership after installation of barricades)

With this alternative, the properties would be disposed of without any permanent alterations to the lock and dam structures. However, in order to deter access to the river side lock wall, the upstream and/or downstream miter gates would be gated off with barricades on the land side miter gates. Sites would be collectively and individually evaluated for fan gate installation. The Louisville District would remain responsible for the properties up to the point at which the ownership is transferred. Any action necessary to complete the real estate transfer would be included, and the only construction activity associated with this alternative is the installation of signage and barricades.

2.3 Alternative 3 (Disposal of Federal Ownership after Dam Removal and Lock Stabilization)

With this alternative, the dams would be removed and the locks would be stabilized before disposal. At each site, locks would be filled with materials from the demolition of the dam. Sites would be evaluated for removal both collectively and individually. Some of the lock and dam sites are in remote and undeveloped areas, making the insertion of floating equipment from the bank difficult due to unimproved roads. Additionally, the dams do not provide sufficient depth of water for some modern equipment, which may lead to a need to use specialized equipment in order to work from floating platforms. Due to the difficulties perceived with using floating equipment as is typical in marine construction, it was assumed the work at any of the locks and dams would have to be done from a temporary construction access road that would be built within the river channel. The access road would consist of dumped stone to build a raised access road and work platform in the river from which equipment could work. Demolition of the existing structures could then proceed. The demolition would be accomplished by mechanical excavation equipment such as track hoes, clamshell excavation, etc. Material could be loaded into trucks via the temporary access embankment and then taken and disposed of by placing it in the lock chamber and, if necessary, along the downstream approach wall. After the dam removal is accomplished, the property would be disposed through normal General Services Administration (GSA) and Corps of Engineers procedures.

Pool level changes expected as a result of Alternative 3 are listed in Table 1. Pool elevations are expressed in feet above mean sea level.

Table 1. Changes in Pool Elevations with the Removal of Green River Dams Nos. 3 through 6, and Barren River Dam No. 1

Lock and Dam Pool	Existing Average Pool Elevation	New Average River Elevation	Net Change
Barren River No. 1 (River Mile 18)	413	394	19 feet
Green River No. 3 (River Mile 120)	382	369	13 feet
Green River No. 4* (River Mile 160)	398	387	11 feet
Green River No. 5 (River Mile 174)	413	396	17 feet
Green River No. 6 (River Mile 186)	423	410	13 feet

*Existing pool elevation is given for before the dam failed. The actual net change at this location will be significantly less than that expressed.

Sources: Engineering Appendix, *Green and Barren Rivers Locks and Dams – Reconnaissance Disposition Study*, U.S. Army Corps of Engineers.

. The removal of Green River Dam Nos. 3 and 5 would adversely affect municipal water supply intakes in such a way that local water authorities indicated there would be no practicable, dependable remedy, and public officials were firmly opposed to such removal. Removal of those dams was therefore dismissed from consideration.. Removal of Barren River Dam No. 1 would not impact current water supply facilities; however, there is high potential for the pool to be used by the City of Bowling Green, Kentucky as a source of water supply. For this reason, Barren River Dam No. 1 will no longer be considered for removal. Therefore, from this point, only removal of Dam No. 6 will be evaluated in this EA.

2.4 Alternative 4 (Disposal of Federal Ownership after Lock Modification)

With this alternative, the locks would be modified before disposal but the dams would be left undisturbed. As with the other alternatives, sites would be evaluated for modification both collectively and individually to ensure the most practical project is implemented. Similar to Alternative 3, locks would be filled to stabilize gates and lessen the opportunity for trespassers to fall into the lock chambers. Additionally, at Green L&D No. 3, the upstream miter gates were not fully

mitered and pool was being held by the downstream miter gates. However, to maintain pool for long term consideration, a concrete plug would be placed against the upstream face of the upstream miter gates. Also, in order to deter access to the river side lock walls, the upstream and/or downstream miter gates would be gated off with barricades on the land side miter gates and signage would be installed, as under Alternative 2.

3.0 ENVIRONMENTAL SETTING

3.1 General Characteristics

The Green River Basin is located in west-central Kentucky and extends into north-central Tennessee. The largest of the twelve river basins in Kentucky, the Green River Basin encompasses approximately 9,230 square miles and drains all or portions of thirty-one counties in Kentucky and four counties in Tennessee. The Green River, originating in Lincoln and Casey counties, Kentucky, flows in a northwesterly direction for 330 miles to its confluence with the Ohio River near Evansville, Indiana. Elevations range from over 1,050 feet at the source to approximately 337 feet at the Ohio River pool. Averaged river gradient is 1.9 feet per mile and ranges from four feet per mile at the initial reach to 0.25 feet per mile where it enters the Ohio River. The portion of the Green River that traverses the Mammoth Cave National Park has been designated an Outstanding Resource Water and a Kentucky Wild River by the Kentucky Division of Water (Schuster, 1996).

The Barren River, which is the largest tributary of the Green River, begins in Monroe County, Kentucky, and flows northwesterly 158 miles to its confluence with the Green River at Green River Mile 149.5. The Barren River drains an area of approximately 2,141 square miles. Average river gradient in the Barren River is approximately 1.6 feet per mile. Other tributaries of the Green River include Rough River, Bear Creek, Nolin River, Pond River, and Mud River.

The study area encompasses the portion of Ohio, Muhlenberg, Butler, Warren, and Edmonson Counties that are directly affected by the pools of Green River Lock and Dam Nos. 3 through 6, and Barren River Lock and Dam No. 1 (including affected terrestrial habitat). The Western Coal Field and the Mississippi Plateau regions make up the majority of the physiographical regions of the study area. A majority of the study area lies within the Western Coal Field region that is characterized by gently rolling uplands and broad flood plains up to three miles wide. The remainder of the study area is characterized by undulating limestone uplands and moderately wide floodplains. Approximately 95 percent of the Green and Barren river basins are either used for agriculture or are forested. Agricultural crops include tobacco, corn, and wheat on the high quality soils in floodplain areas. Forests are mainly composed of secondary oak-hickory forest, with ash,

poplar, sugar maple, and elm as associated species. Although clearing has eliminated the majority of the virgin forests in the area, small tracts classified as near original vegetation may be found in the region, specifically in Mammoth Cave National Park. Forested, scrub-shrub, and emergent wetlands are found in the lower portion of the study area. Black willow, baldcypress, swamp and eastern cottonwood, oaks, river birch, and silver maple occur in the wetland areas in the western portion of the project area.

3.2 Land Use

In general, land uses adjacent to the Green River and Barren River within the study area are rural, undeveloped woodland, agriculture, and small urban and industrial areas.

3.2.1 Green River Lock and Dam No. 3

Land owned by the Federal Government at Green River Lock and Dam No. 3 includes 4.99 acres in Muhlenberg County, and 6.72 acres located in Ohio County. Improvements at the site include a gravel parking lot on the left descending bank, and remains of a brick dwelling and two metal sheds. Adjacent land use is agriculture and residential. The northern portion of the property is undeveloped woodland. Recreational use of the Green River upstream of Lock and Dam No. 3 is evident, based on the presence of pleasure craft. Commercial fishing is also conducted in the pool above Green River Lock and Dam No. 3 (personal communication, John Spear, January 26, 2000).

3.2.2 Green River Lock and Dam No. 4

Land owned by the Federal Government at this site includes 0.01 acres in Butler County, which supports a U.S. Geological Survey (USGS) gauging station. The dam at Green River Lock and Dam No.4 was breached on May 24, 1965, and barge traffic in this area of the Green River was closed. Land use adjacent to this site includes the former lock and dam site, a residential community, and pastureland. The portion of the Green River adjacent to this site can accommodate light pleasure craft and is used for recreation.

3.2.3 Green River Lock and Dam No. 5

Land owned by the Federal Government at Green River Lock and Dam No. 5 includes 27.064 acres along the right descending bank in Butler County, and 5.21 acres along the left descending bank in Warren County. Remains of old structures (sidewalks, remnant structures, concrete stairs, etc.) are evident on-site. Remaining structures at this site include the old operations house. Lock and Dam No. 5 was de-activated on August 31, 1951. Adjacent land use on the right descending bank is residential, pastureland, undeveloped woodland; timber production, residential, and pastureland are

present on the left descending bank. Recreational use by fisherman upstream and downstream of Lock and Dam No. 5 is extensive.

3.2.4 Green River Lock and Dam No. 6

Land owned by the Federal government at Green River Lock and Dam No. 6 includes 18 acres along the right descending bank and 0.83 acres along the left descending bank, both in Edmonson County. Remaining improvements to the site consist of a USGS gauging station located on the right descending bank. Adjacent land uses include pastureland, undeveloped timberland, and a single residential site along the right descending bank. Land use along the left descending bank is undeveloped timberland owned by the National Parks Service, pasture land, and light residential. Recreational use is extensive in this area. The pool of Lock and Dam No. 6 extends into the Mammoth Cave National Park. Several canoe liveries operate in this area.

3.2.5 Barren River Lock and Dam No. 1

Land owned by the Federal government at this site includes 16.63 acres along the right descending bank only. Aside from the lock and associated structures, the only structure remaining is the operations house. Adjacent land use is light residential, pastureland, and agriculture on the right descending bank, and undeveloped woodland along the left descending bank.

3.3 Infrastructure

All locks and dams are accessible by either improved or unimproved roads (see location maps in main report).

3.3.1 Green River Lock and Dam No. 3

The 4.99-acre tract (left descending bank) in Muhlenberg County lies alongside Kentucky Highway 70. The site consists primarily of an improved gravel parking lot. The 6.72-acre tract (right descending bank) in Ohio County is accessed by taking an unnamed improved road directly north of the Green River west from Kentucky Highway 369. Neither tract is fenced or gated. Overhead electrical power lines traverse the 6.72-acre tract. No utilities were observed at the 4.99-acre tract.

3.3.2 Green River Lock and Dam No. 4

The site is accessed by Kentucky Highway 403/263 and consists of a 0.01-acre USGS gauging station. Underground electrical utilities are present at the site. No other utilities were observed.

3.3.3 Green River Lock and Dam No. 5

This site is located near Butler and Warren counties, 168.1 miles above the mouth of the Green River, and is accessed by Kentucky highways 185 and 67. Both tracts are fenced, but neither is

gated. Overhead electrical power lines cross the 27.064-acre tract (right descending bank). No utilities were observed at the 5.21-acre tract (left descending bank).

3.3.4 Green River Lock and Dam No. 6

This site is located just upstream of Brownsville, Edmonson County, 181.7 miles above the mouth of the Green River, and is accessed by Kentucky Highway 259. The 18-acre tract on the right descending bank is fenced on the north and west, but not on the south. The 0.83-acre site (left descending bank) is not fenced. Utilities observed on the 18-acre tract include overhead electrical service for the gauging station. An underground telephone line also appears to transit the site. No utilities were observed on the left descending bank.

3.3.5 Barren River Lock and Dam No. 1

The 16.63-acre site is accessed by taking Greencastle-Richardsville Road west from Kentucky Highway 263. Entrance to the site is by a gated dirt road that proceeds south and west from a boat ramp and parking lot adjacent to Taylor Creek. The site is not fenced but the access road is gated. Overhead electrical service transits the site along the access road. No other utilities were noted during the field investigation.

3.4 Socioeconomic

The study area consists of five counties in western Kentucky; Butler, Edmonson, Muhlenberg, Ohio, and Warren. The locks reviewed in this assessment have not been operated for many years. Lock No. 3 was last operated in 1981, Dam No. 4 failed in 1965, and the other locks have not been operated since 1951.

The City of Bowling Green, in Warren County is the only city with the Metropolitan Statistical Area (MSA) status within the study area. Also within the study area is Mammoth Cave National Park, the most popular tourist attraction in Kentucky. Of the 342 National Park Service (NPS) sites that report visitation, Mammoth Cave National Park ranked 114th in the number of visits in 2012, the latest year that comparable visitation figures were available. That year, Mammoth Cave National Park reported over 508,000 visits- 0.18% of total National Park visits.

3.4.1 Population

Historical population figures for each county, the largest city in each county, and the Commonwealth of Kentucky are shown in Table 2. The population in the study area grew 11.6 percent between 2000 and 2010. The population of the study area is forecasted to grow another 5 percent by 2015. The growth rate of the study area is lower than the Commonwealth of Kentucky in all periods.

The five counties in the study area have a land area of 2,354 square miles, or about six percent of the Kentucky land area. In 2010, the study area had a population density of 82.6 people per square mile, while Kentucky had a population density of 109.4 people per square mile. This population density reflects the rural character of the study area. The only urban area in the study area is the City of Bowling Green (2010 population of 57,203) which is on the Barren River.

The median age of the population is higher than the statewide average in every county except Warren County.

The towns on the Green River in the study area are Morgantown (2012 estimated population -- 2,463), Woodbury (2012 estimated population -- 91), and Rochester (2012 estimated population -- 154) in Butler County; Rockport (2012 estimated population -- 269) in Ohio County; and Brownsville (2012 estimated population -- 831) in Edmonson County.

3.4.2 Employment

The size of the labor force and unemployment figures for each county is shown in Table 3. The civilian labor force in the study area increased between 1990 and 2012 by 20.1 percent. The unemployment rate in Butler and Muhlenberg counties decreased during the same period. The decrease in Butler County was 0.1 percent, while unemployment in Muhlenberg County dropped 0.9 percent. The unemployment rate in Kentucky increased by 1.7 percent during the same period. Muhlenberg County is currently the only county in the study area with an unemployment rate lower than the statewide average.

Employment in the study area is diverse, and when measured by category it is similar to the employment distribution of Kentucky. Table 4 shows employment for each county in each category. Manufacturing, educational/ health care services, and government jobs dominant in the study area.

Table 2. Population, Land Area, and Median Age Green River Study

Kentucky County (Largest City)	Land Area (Square Miles)	2000 Pop.	2005 Pop. Est.	2010 Pop.	% Pop. Change 2000-2010	2015 Pop. Forecast	% Pop. Change 2000-2015	1990 Median Age	2012 Median Age
Butler	431	13,010	12,900	12,714	-2.3	12,658	-2.7	34.4	40.3
(Morgantown)		(2,000)	(2,284)	(2,515)					
Edmonson	302	11,644	11,987	12,171	4.3	12,429	4.3	34.8	41.7
(Brownsville)		(674)	(897)	(952)					
Muhlenberg	478	31,839	31,595	31,493	-1.1	31,548	-0.9	34.8	41.0
(Central City)		(5,214)	(5,074)	(4,878)					
Ohio	596	22,916	23,611	23,818	3.8	24,362	5.9	35.0	39.0
(Beaver Dam)		(3,185)	(2,904)	(2,882)					
Warren	547	92,522	102,121	114,172	19	125,085	26.0	31.2	32.7
(Bowling Green)		(40,450)	(41,688)	(57,203)					
Study Area Total	2,354	171,931	182,214	194,368	11.6	206,082	16.6		
State of Kentucky	39,669	4,068,132	4,182,742	4,339,367	6.3	4,522,468	10.1	33.0	38.0

Source: Census Bureau, U.S. Department of Commerce.

Table 3. Labor Force and Unemployment Green River Study

County	1990 Civilian Labor Force	1990 Unemployment Rate	1996 Civilian Labor Force	1996 Unemployment Rate	2012 Civilian Labor Force	2012 Unemployment Rate
Butler	5,471	10.6%	5,670	7.5%	5,487	10.5%
Edmonson	4,329	9.1%	4,783	10.2%	5,386	10.2%
Muhlenberg	12,861	8.7%	12,025	8.5%	12,760	7.8%
Ohio	8,761	8.3%	9,724	8.8%	9,906	9.5%
Warren	43,090	7.1%	47,948	6.2%	59,676	9.5%
Study Area Totals	74,512	7.9%	80,150	7.2%	93,215	9.6%
State of Kentucky			1,864,635	5.6%	2,054,159	9.5%

Source: Census Bureau, U.S. Department of Commerce and the Commonwealth of Kentucky Department of Employment Services.

Table 4. Covered Employment By Industrial Division
2010 U.S. Census Bureau

County	All	Mining/ Agriculture/ Logging	Construction	Manuf.	Transp./ Utilities	Retail Trade	Finance/ Insurance/ Real Estate	Educational / Heatlh Care Services	Gov.
Butler	4,913	178	646	1,405	319	143	165	877	643
Edmonson	4,840	99	471	856	235	539	306	1,137	849
Muhlenberg	11,764	626	800	1,424	951	1,718	260	3,268	2,638
Ohio	8,960	618	692	2,190	463	1,199	246	1,632	1,498
Warren	53,996	854	3,127	8,712	2,177	7,214	2,087	10,746	9,346
Study Area	72,709	2,375	5,736	14,587	4,145	10,813	3,064	17,660	14,974
Study Area		3.2%	7.9%	20.16%	5.7%	14.9%	4.2%	24.3%	20.6%
State of Kentucky	1,859,549	54,555	116,740	254,467	111,861	218,316	102,186	448,716	289,489
State of Kentucky		2.9%	6.3%	13.7%	6.0%	11.7%	5.5%	24.1%	15.6%

Source: U.S. Census Bureau

3.4.3 Income

Table 5 shows per capita personal income, persons below poverty level, and median household income for each county. In 2012 the counties in the study area have per capita personal income ranging from $17,607 in Butler County to $23,537 in Warren County. The highest percentage increase since 2000 was 36.3 percent in Muhlenberg County and the lowest was 20.2 percent in Ohio County. Meanwhile, average per capita personal income in Kentucky in 2012 was $23,210 with growth of 31 percent since 2000.

The 2012 poverty levels in the study area ranged from 18.9 percent of persons in Edmonson and Warren Counties to 22.7 percent of persons in Butler County. The 2012 Kentucky poverty level was 18.6 percent of persons. Between 2000 and 2012, the poverty level in all counties in the study area, except Muhlenberg County, increased along with the poverty level in Kentucky which increased by 0.5 percent. The poverty level declined by 0.4 percent in Muhlenberg County.

The median household income increased in the study area between 2000 and 2012 ranged from 20.4 percent in Warren County to 50.5 percent in Edmonson County. The statewide median household income increase during the same period was 32.1 percent.

3.5 Water Quality

3.5.1 Surface Water

During calendar year 2011, Kentucky Division of Water (DOW) focused monitoring activities on the Green River Basin Management Unit (BMU). These activities included probabilistic stream monitoring, reference reach monitoring, fish tissue collection, lake and large river monitoring, sampling for Chlorophyll-a in rivers and testing for ambient water quality. These data will be included in the DOW 2014 Integrated Report.

Two of these monitoring stations are located on Green River, one at Munfordville in Hart County, upstream of all the project sites on the Green River, and one at Livermore in McLean County, downstream of the project sites on that river. Another monitoring station is located on the Barren River, upstream of Lock and Dam No. 1 near Bowling Green in Warren County.

Table 5. Per Capita Income, Poverty Level, and Median Family Income Green River Study

County	Per Capita Personal Income				Percent of Persons Below Poverty Level			Median Household Income			
	1997 (Dollars)	2000 (Dollars)	2012 (Dollars)	2000-2012 Change	1995	2000	2012	1995	2000	2012	2000-2012 Change
Butler	14,843	14,617	17,607	20.4%	20.8%	16%	22.7%	23,501	29,405	36,237	23.2%
Edmonson	13,211	14,480	18,775	29.7%	21.2%	18.4%	18.9%	22,661	23,413	35,243	50.5%
Muhlenberg	15,893	14,798	20,173	36.3%	19.6%	19.7%	19.3%	24,158	28,566	38,835	35.9%
Ohio	15,927	15,317	18,409	20.2%	22.1%	17.3%	20.8%	24,047	29,557	38,286	29.5%
Warren	22,254	18,847	23,537	24.9%	15.7%	15.4%	18.9%	32,131	36,151	43,509	20.4%
State of Kentucky	20,570	17,721	23,210	31%	17.9%	18.1%	18.6%	28,929	32,256	42,610	32.1%

Source: Census Bureau, U.S. Department of Commerce and the State Data Center, University of Louisville.

Using data it gathers on chemical water quality, sediment quality, fish tissue residue, habitat condition, and biotic conditions, DOW evaluates streams and rivers for their support of four important uses of these waterways; aquatic life, swimming, drinking water, and fish consumption, and presents the data in a DOW report called the List of Waters. The Green and Barren rivers are not included in the report's list of High-Priority Projects for severely impacted streams.

In May 2005, due to improvements in water quality, the DOW delisted the Barren River from RM 29.4 to RM 43.6 as "Impaired Use" stream for aquatic life and swimming for reasons of contamination by metals and pathogens. In 1998, the DOW rated water quality in the Green River in Hart, McLean, Edmonson, and Green counties as impaired for the use of swimming due to contamination by pathogens and impaired use for aquatic life and swimming in Muhlenberg County because of pH problems. Those sections in Hart and McLean counties were also delisted in May 2005 after improvements in water quality.

3.5.2 Groundwater

The location, availability, and quality of the groundwater within the project study area vary depending upon local geologic and hydrologic factors. According to a study completed for the USACE (1979), groundwater can be divided into two regions within the project study area. Those two regions coincide with two distinct geologic regions of south central Kentucky, the Western Coal Field and the Mississippian Plateau. The Western Coal Field, which includes the counties of Ohio, Butler, and Muhlenberg, is an area of rolling uplands and alluvial terraces of low relief. The Mississippian Plateau, which contains Edmonson and Warren counties, is a limestone area with considerable subsurface drainage.

Most groundwater found in the Western Coal Field in shallow aquifers is characterized by the presence of sodium or calcium bicarbonate, while that found in deeper aquifers is more highly mineralized with sodium chloride. Most groundwater in this region is soft to moderately hard, but may contain objectionable quantities of iron.

Groundwater of the Mississippian Plateau is generally of the calcium bicarbonate type and ranges from moderately to very hard depending upon its source. Sodium chloride and hydrogen sulfide present the major problems in waters of this region. Hydrogen sulfide can be toxic, but its strong odor usually allows for detection long before it reaches extreme levels. High levels of sodium chloride could be a health concern for people on low sodium diets and can also interfere with taste, the watering of certain plants and may increase the corrosivity of the water and damage household plumbing.

3.5.3 Wells

The Kentucky Geological Society has 16 wells registered within a 3,000-foot radius of the five lock and dam installations that are subject to the proposed action. Available data on these wells is presented in Table 6.

Table 6. Wells Within the Project Study Area

Lock and Dam	Number of Wells	Well Type	Total Depth
Barren River No. 1 (River Mile 18)	3	2 domestic 1 abandoned	65', 25' N/A
Green River No. 3 (River Mile 120)	5	4 domestic 1 oil well	33', 75', N/A, N/A N/A
Green River No. 4 (River Mile 160)	3	3 domestic	100', 100'
Green River No. 5 (River Mile 174)	2	1 livestock 1 domestic	40' 100'
Green River No. 6 (River Mile 186)	3	3 domestic	N/A, N/A, N/A

Source: Kentucky Geological Survey.

3.5.4 Water Intakes

Water intakes on the Green River that are located within the project study area are shown in Table 7. The depth of the intake is given as the approximate depth below the water surface at normal summer levels.

Table 7. Water Intakes Within the Project Study Area

Location/River Mile	Purpose	Number/Depth of Intake(s)
Cromwell (Purdue Farms) River Mile 130.40	Process water	1 @ 8 feet
Cromwell (Ohio Co. Water District) River Mile 130.50	Potable water	1 @ 10 feet 1 @ 15 feet
Morgantown (Butler Co. Water District) River Mile 142.70	Potable water	1 @ 3 feet
Morgantown (City of Morgantown) River Mile 143.30	Potable water	1 @ +8 feet* 1 @ 6 feet
Brownsville (Edmonson Co. Water District) River Mile 181.40	Potable water	1 @ 5 feet 1 @ 8 feet 1 @ 12 feet

*This is the high water intake. At normal low water it is approximately 8 feet above the water surface.

Source: G.E.C., 2000.

3.5.5 Contaminated Sources

The Nature Conservancy (TNC) study published in the *Green River Bioreserve Strategic Plan*, August 1998, pointed out contamination of both surface and groundwater in the project study area by hazardous materials is possibly from traffic accidents, businesses, homes and farms anywhere in the watershed. These materials can disperse relatively quickly through complex underground conduits underlying the watershed to contaminate underground streams and/or emerge from springs to contaminate surface streams far from the source. Because of traffic volume, and the variety and volume of materials transported, Interstate 65, other major highways, and railroads are likely sites of hazardous materials spills. In one study (Leitheuser 1988), five traffic or train accidents occurred in the vicinity of Mammoth Cave National Park between 1979 and 1985 that resulted in spills of cyanide salt, creosol, synthetic solvents, unidentified pesticides, and methyl alcohol. A 1979 accident caused mortality of aquatic cave organisms in part of the Mammoth Cave system.

Besides sudden-release sources of contamination, surface and ground waters may also be contaminated by point and non-point sources of contamination. Non-point sources within the project study area may include farming, logging, and mining operations, as well as urban runoff. Pesticides, herbicides, fertilizers, sediments/suspended solids, pathogens, petroleum products, brine, and heavy metals are among the contaminants that may result from non-point sources. Point sources may include wastewater treatment, industrial plants, mining, and storm water discharge points. Common contaminants may include chlorine, chloramines, pathogens, metals, petroleum products, organic matter, and ammonia.

3.6 Air Quality

Kentucky has operated an air quality monitoring network since July 1967. Currently, the network includes 137 monitoring stations in 35 counties. Monitoring station data is used to demonstrate compliance with and/or progress made toward meeting national ambient air quality standards (NAAQS), identify pollution trends, and to evaluate public health impacts and the possible need to initiate emergency control procedures. Of the five counties included in the study area for this project, only Warren and Edmonson counties have established air quality monitoring stations.

Mammoth Cave National Park is designated as a Class I area under the Clean Air Act, as amended in 1977, and 1990, and is the only Class I area in the Commonwealth of Kentucky. The Class I status provides the park with the most stringent protection from air quality impairment, the

park has an extensive air quality monitoring program measuring: hourly concentrations of ozone; sulfur dioxide; carbon monoxide; nitric oxide; and total oxides of nitrogen; fine particulate matter less than 10 microns measurements; weekly composite mercury concentration and deposition measurements; weekly speciated composite dry fine particle deposition measurements; 15-minute visibility measurements by particle scattering coefficient and 15-minute high resolution images of the Green River and Green River valley; and hourly meteorology. Data collected from the park air quality station undergoes extensive quality assurance and quality control procedures including routine performance audits by the Commonwealth of Kentucky and the US Environmental Protection Agency.

The air quality monitoring station in Warren County measures only particulate matter. Particulate matter is a broad classification of non-gaseous pollutants that consists of very fine solid particles and liquid droplets and aerosols. The averages for $PM_{2.5}$ [particles less than or equal to 2.5 microns (μm) diameter] taken at the Warren County monitoring stations in 2013 were 39 and 76 micrograms per cubic meter ($\mu g/m^3$) (Kentucky Division of Air Quality Fiscal Year 2013 Annual Report). These averages for $PM_{2.5}$ at both monitoring stations were well below the NAAQS maximum of 150 $\mu g/m^3$.

3.7 Noise

The Commonwealth of Kentucky does not have a statewide noise law. The Department for Natural Resources and Environmental Protection, Division of Air Quality, is responsible for noise control and abatement. Green River Lock and Dam Nos. 3 through 6 and Barren River Lock and Dam No. 1 are located outside of major metropolitan areas with high noise producing facilities. No significant noise producing operations remain in effect at these facilities. The only source of noise at the facilities is that of water flowing over the dams.

3.8 Hazardous/Toxic Materials

In February 2000, an environmental baseline survey (EBS) was performed in to determine the possibility that the sites have been contaminated by hazardous, toxic, or radioactive wastes (HTRW); or, that the potential exists for contamination by such materials. The EBS was confined to those portions of the lock and dam properties that remain in Federal Government ownership. Site visits in December 2013 confirmed the findings of the EBS which are summarized in the following subsections.

3.8.1 Polychlorinated Biphenyls

One pole-mounted electrical transformer, located at Green River Lock and Dam No. 6, appears to be marked with a polychlorinated biphenyl (PCB) warning label. Based on a visual inspection of the transformer from the ground, it seems to be in good condition with no leakage of oil observed.

3.8.2 Petroleum Products/Petroleum Derivatives

In 2000, hydraulic oil stains were observed in the operations buildings and at several locations in the lock chambers at Green River Lock and Dam No. 5, and Barren River Lock and Dam No. 1. The stains appear to be the result of vandalism to the hydraulic piping system, e.g. bullet holes in exposed pipes. Some hydraulic oil has been released to the environment. On the December 2013 site visit, there was no longer any evidence of hydraulic oil leaks. It is likely all petroleum products have since leaked from the existing infrastructure since the locks were taken out of operation. No other petroleum products or petroleum derivatives were found at the other locks and dams during the survey.

3.8.3 Lead

Chipped, cracked, and flaked paint was observed at all locks and dams within the project area. The paint was on fittings associated with the locks and on various structures that remain on-site. No samples were taken to determine if a hazard to human health exists, however, based on the age of the structures, it seems likely that lead-based paint (LBP) is present at all locks and dams within the project area.

3.8.4 Asbestos

Possible asbestos containing material (ACM) in the form of ceiling tiles and other materials was observed in the structures remaining at Green River Lock and Dam No. 3. No samples were taken to confirm the presence of ACM. No other potential ACM was observed at the other locks and dams within the study area.

3.9 Biological Resources

The Green and Barren River basins provide exceptional habitat for a variety of terrestrial and aquatic communities. The banks of the Green and Barren rivers support riparian vegetation, which when combined with the adjacent forested land, varies in width from approximately 30-feet to several thousand feet. This riparian zone provides nesting, roosting, and foraging habitat for large and small mammals, birds, reptiles and amphibians; helps to maintain stable water temperatures; provides a source of detritus; reduces shoreline erosion; and serves as a buffer zone between the rivers and adjacent upland forests.

3.9.1 Terrestrial Fauna

A variety of large and small mammals occurs within the study area. Typically, species composition is that which is associated with eastern hardwood forests, slope forests, and wet bottomland hardwoods. Mammalian fauna within the study area include, but are not limited to, white-tailed deer, red fox, gray fox, raccoon, opossum, woodchuck, beaver, eastern cottontail rabbit, spotted skunk, mice, chipmunks, gray squirrel, and fox squirrel. Over 200 bird species occur within the study area (USWFS, 2013). Game species include bobwhite quail, mourning dove, woodcock, eastern wild turkey, and waterfowl. Other birds within the study area include whippoorwills, owls, hawks, warblers, eastern blue bird, cardinal, blue jay, woodpeckers, Carolina wren, and various other songbirds.

Reptiles and amphibians found within the project area include the hellbender, spotted salamander, green frog, snapping turtle, eastern box turtle, red-ear slider, ringneck snake, eastern hognose snake, and northern water snake.

Karst features within the study area provide habitat for cave-dwelling species such as the Federally endangered gray bat (*Myotis grisescens*) and Indiana bat (*M. sodalis*).

3.9.2 Aquatic fauna

The fishes of the Green River are among the most diverse in Kentucky and are nationally important in terms of fish zoogeography, i.e., distribution, and need for conservation (Cicerello and Hannan, 1991). Kentucky waters support 226 native species or about one fourth of all North American freshwater fish fauna. Two-thirds (151 species) are known from the Green River and its tributaries.

Prior to the last ice age, the Green River was a smaller, more isolated, headwater tributary of the ancestral Ohio River. In part because of this isolation, the Green River supports the most unusual fish fauna in the lower Ohio-upper Mississippi basin, including five endemics (species that occur nowhere else), one species exclusively shared with the Kentucky River, three species of cavefishes, and an admixture of Coastal Plain and upland fauna. The Green River also served as an important refuge for northern species displaced by Pleistocene glaciers that did not extend south into Kentucky thus allowing these species to later invade streams created during the retreat of the glaciers.

Construction of the locks and dams changed aquatic habitats from those associated with cool free-flowing rivers to slower-flowing warm water communities. Riffle and shoal areas with sand and gravel substrates were eliminated and replaced with permanently inundated pools with finer sediments and silt bottoms. Subsequently, the species composition within the reaches of the Green and Barren rivers affected by the pools were altered as well. Construction of the locks and dams altered species composition within the pools to that of a slower warmer water system. Some native species increased in numbers while many more declined, as they were not as well adapted to the

change in habitat. This changed habitat also resulted in an increase in rough fish, some of which (freshwater drum, redhorse, and buffalo) represent commercially important species within the Green and Barren rivers.

Fourteen species of sport fishes are found in the project area including largemouth bass, smallmouth bass, white and black crappie, channel catfish, longear, redear, and green sunfish, walleye, rockbass, sauger, white bass, and striped bass. Another game species found naturally occurring in the Green and Barren rivers is the Ohio muskellunge.

The Green River and its tributaries are recognized as supporting one of the most diverse mussel faunas in North America (Stansbury 1965, Isom 1974). Seventy-one of the 104 species found in Kentucky are known from the Green River basin. More than one-third of the species inhabiting the Green and Barren rivers are considered rare, threatened or endangered at the state or Federal level, mostly due to changes in aquatic habitat caused by human alteration of land and water features (Cicerello and Hannan 1990). Fifty-seven of these 71 species of mussels are found within the Green River from Munfordville, Kentucky (Green River Mile 225), to the upper reaches of Pool No. 6 in Mammoth Cave National Park (personal communication, Ronald Cicerello, Kentucky State Nature Preserve Commission, from USFWS report, 1999). The most significant factor in the absence of the 14 missing species is the reduction in mussel habitat associated with construction of the locks and dams on the Green and Barren rivers.

3.9.3 Threatened and Endangered Species

Threatened and endangered species are found within the Green and Barren rivers, as well as in terrestrial habitat adjacent to the rivers. The Federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system. Populations of this endangered species have been impacted by the impoundment of Green River behind Dam 6. The pool has changed the base level for the cave system. The operation of Green River Lake has changed both the periodicity and magnitude of seasonal flood events from that which would be expected under natural conditions. These changes have affected sedimentation and food supply, among other parameters, within the subterranean environment. The USFWS has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the Kentucky cave shrimp. In addition to the cave shrimp critical habitat designation, critical habitat for the diamond darter (*Crystallaria cincotta*) from the lower end of Cave Island (RM200.3) upstream to Roachville Ford (RM294.8).

Caves in the study area also provide habitat for the Federally endangered gray bat and Indiana bat, which use the caves primarily as hibernacula. One cave within the study area is known

to support a gray bat maternity colony (USWFS, 1999), and future surveys in the study area may reveal the presence of other maternity colony caves. Suitable habitat for Indiana bat maternity colonies exists within the study area, and studies in the future may reveal the presence of additional roost colonies.

Threatened and endangered freshwater mussels within the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket mussel (*Lampsilis abrupta*), fanshell (*Cyprogenia stegaria*), spectacle case mussel (*Cumberlandia monodonta*), sheepnose (*Plethobasus cyphyus*) and the rabbitsfoot mussel (*Quadrula cylindrical cylindrica*). Proposed critical habitat for the rabbitsfoot mussel extends Maple Springs Ranger Station Road upstream to Green River Dam. A viable population of the spectaclecase mussel is known to occur in about an approximately 10-mile reach of the Green River upstream of the confluence with the Barren River but below Green River L&D 5. Fresh-dead specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) indicate that these species persist in the Green River (USFWS, 1999). Other listed mussel species that may still occur in the study area are the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*E. torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*E. sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussel are still reproducing in the Green River, and it is thought that this is the only, or one of the few, rivers in which this occurs (pers. communication, Monte McGregor, KDFWR, 2013). None of the Federally listed threatened or endangered mussel species were found in the pool behind Dam 6 during a three year survey of mussels in Mammoth Cave National Park (Cicerello and Hannan, 1990). These species have been reported from the free flowing section of the river upstream of the influence of Dam 6 and in the free flowing sections of the Green and Barren rivers downstream of Dam 5 which were created by the failure of Dam 4.

Federally threatened plants that may be found in the study area include Price's potato bean (*Apios priceana*).

Other uncommon species that are potential Federal candidates for listing as threatened or endangered may be found in or around the Green and Barren rivers. These include the southeastern bat (*M. austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*M. leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*), eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender (*Cryptobranchus alleganiensis*), Kirtland's water snake (*Clonophis kirtlandi*),

copperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), Kentucky creekshell mussel (*Villosa ortmanni*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). Any of these species could be listed in the future if their numbers decline and threats to their survival continue.

3.10 Wetlands and Floodplains

U.S. Department of the Interior, National Wetlands Inventory (NWI) maps, dated 2013, were reviewed to determine the presence of wetlands within the project area including the Government owned properties at Green River Lock and Dam Nos. 3 through 6 and Barren River Lock and Dam No. 1. The NWI maps showed no wetlands landward of the government owned properties at Lock and Dam Nos. 3 through 6 along the Green and Barren rivers Lock and Dam No. 1 with the exception of a linear band of wetlands running the length of the rivers on both banks (see Figures 6 through 10). This area includes the riparian zone directly adjacent to the river and is affected hydrologically with the fluctuation in river levels. NWI classification is a palustrine system with a forested class. Species composition is broad-leafed deciduous species and the water regime is temporarily flooded with a special modifier being diked/impounded. U.S. Department of Agriculture, Natural Resources Conservation Service soil survey information was reviewed for each lock and dam. The majority of the soils mapped were Nolin series soils. Nolin series soils are generally well drained located in the flood plains and in upland depressions with slopes ranging from 0 to 4 percent. The Nolin series is listed as a hydric soil in the *Hydric Soils of the United States, U.S. Department of Agriculture, Revised October 1990*. Soil samples were not taken to confirm NRCS data, however, a field investigation of government owned property adjacent to Lock and Dam Nos. 3 through 6 on the Green River and Lock and Dam No.1 on the Barren River confirmed the NWI classifications for this area with the exception of Barren River Lock and Dam No. 1. A small (less than one acre) palustrine forested wetland dominated with red maple was observed upstream of the lock on the right descending bank. This area appeared to have a seasonally flooded water regime and holds backwater from the river during periods of high flow.

The reach of the Green and Barren rivers within the study area, where pooling occurs from the locks and dams, is classified as a lacustrine system, with a limnetic subsystem and an unconsolidated bottom. Water regimes in these areas are permanently flooded with a special modifier being diked/impounded. The portion of the rivers not impacted by the pools is classified as

a riverine system with a lower perennial subsystem and an unconsolidated bottom, and a permanently flooded water regime. The difference in the classification is the presence of the locks and dams.

Wetlands adjacent to the Green and Barren rivers within the study area include small forested, scrub-shrub, or emergent wetlands in the floodplains, and riverine systems associated with the tributaries. Wetland systems include palustrine, lacustrine and riverine with water regimes ranging from temporarily flooded to permanently flooded. The larger more definable wetland systems are located in the eastern portion of the study area which contains the broader floodplains.

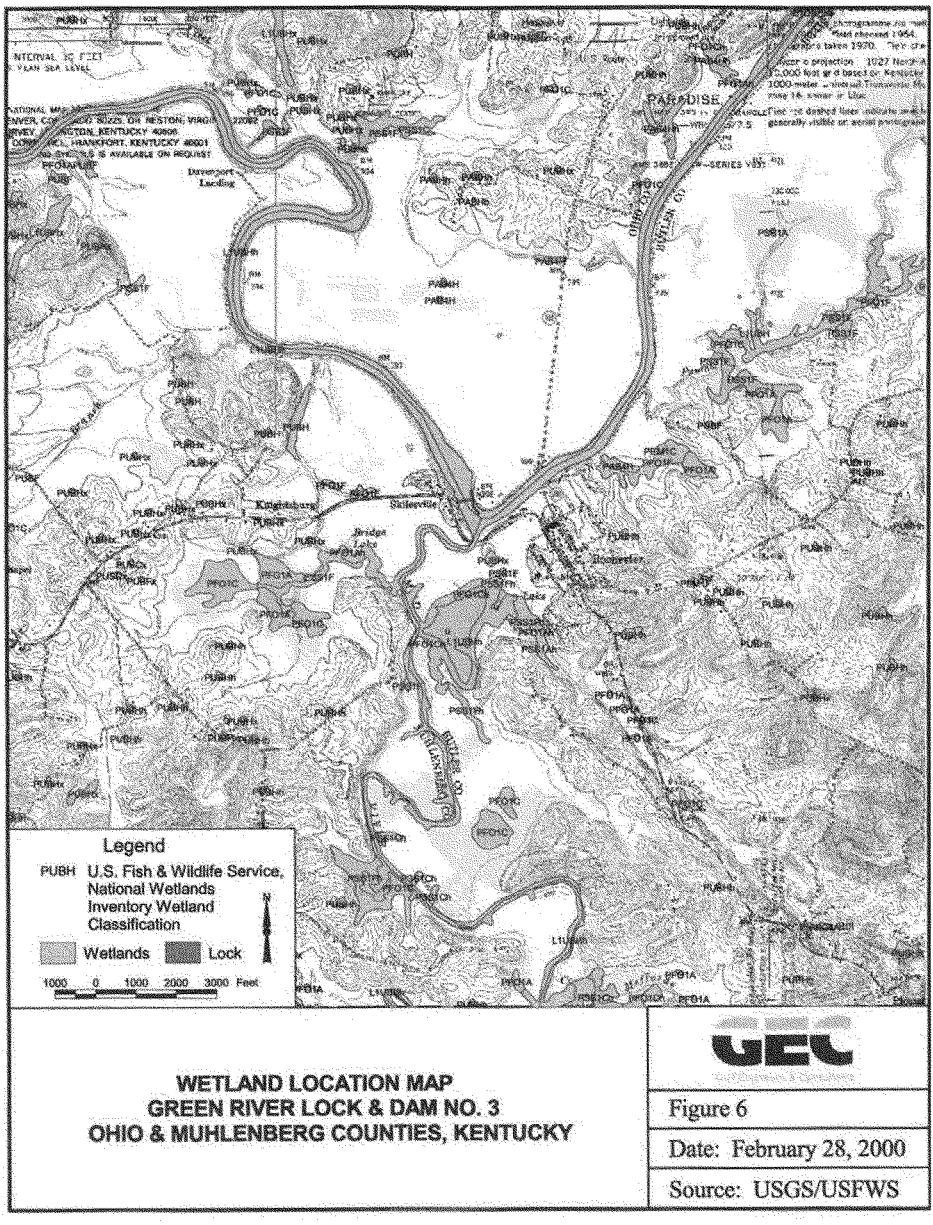


Figure 6. Wetland location map for Green River Lock and Dam No. 3.

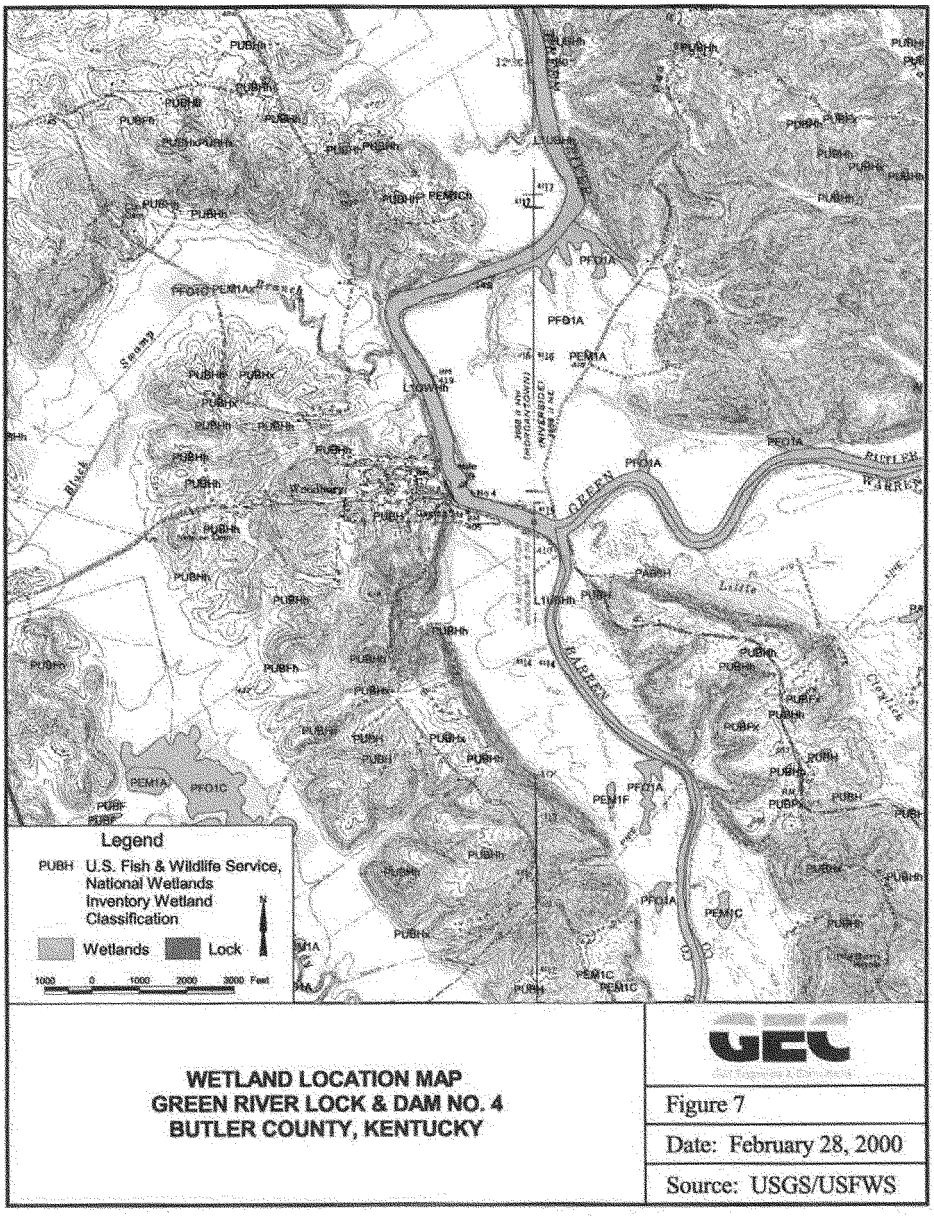


Figure 7. Wetland location map for Green River Lock and Dam No. 4.

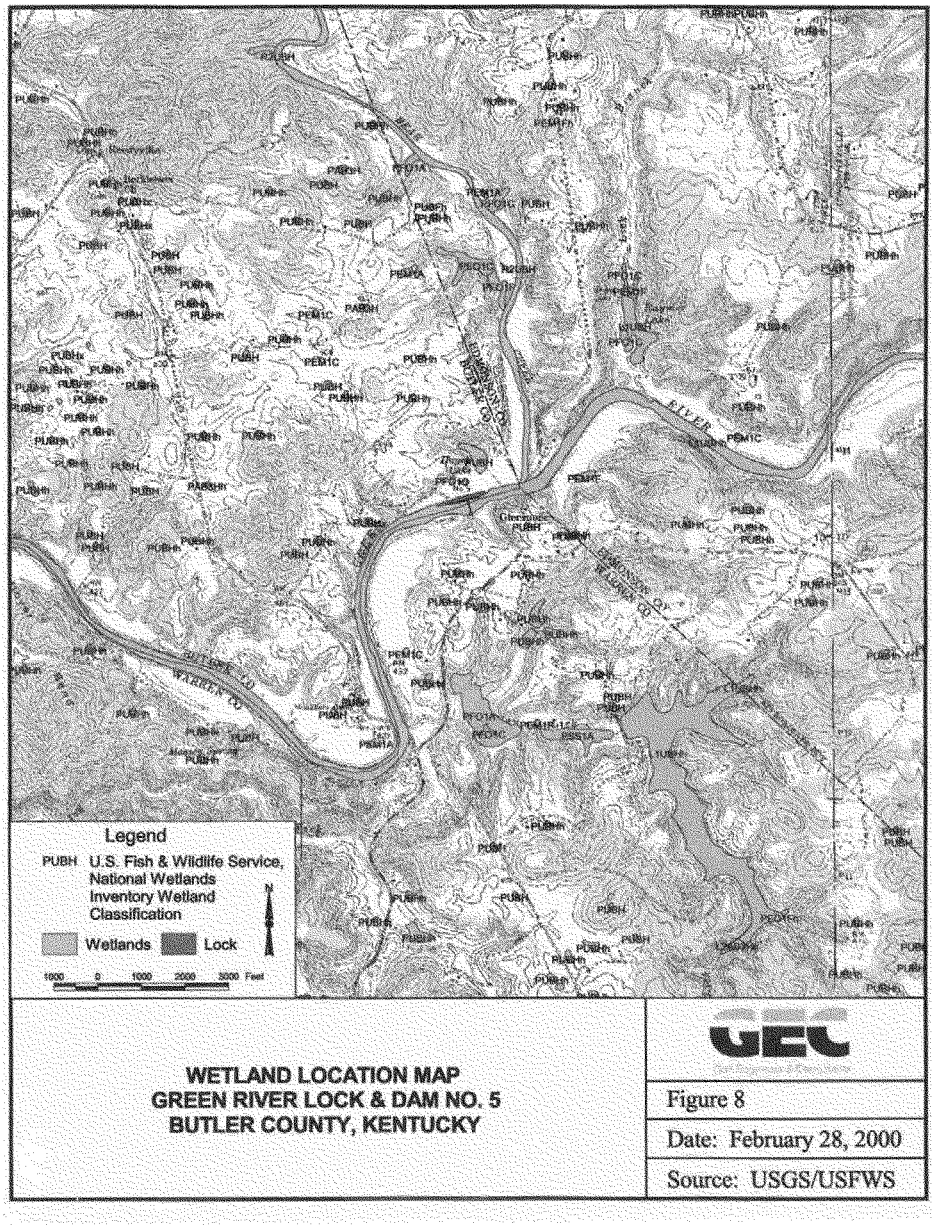


Figure 8. Wetland location map for Green River Lock and Dam No. 5.

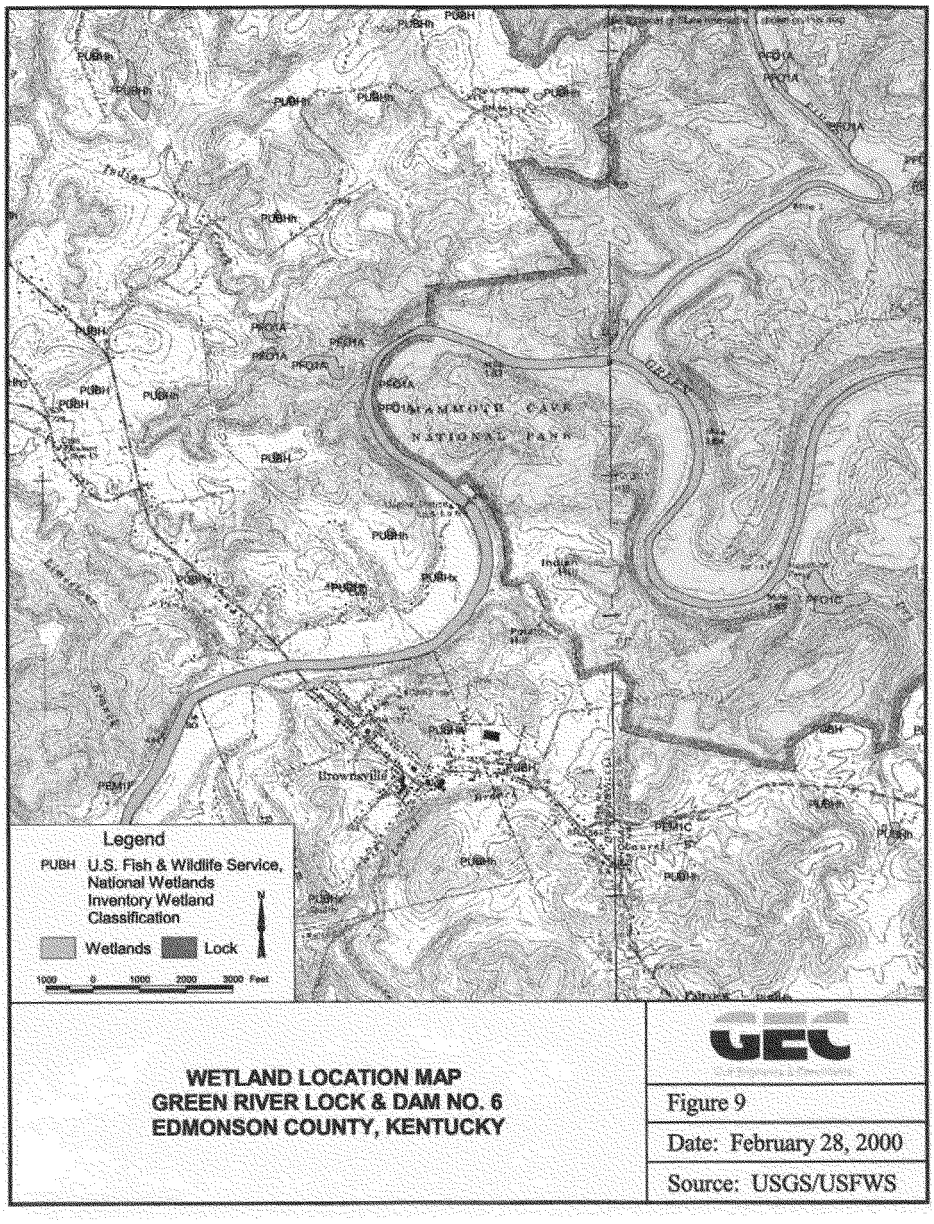


Figure 9. Wetland location map for Green River Lock and Dam No. 6.

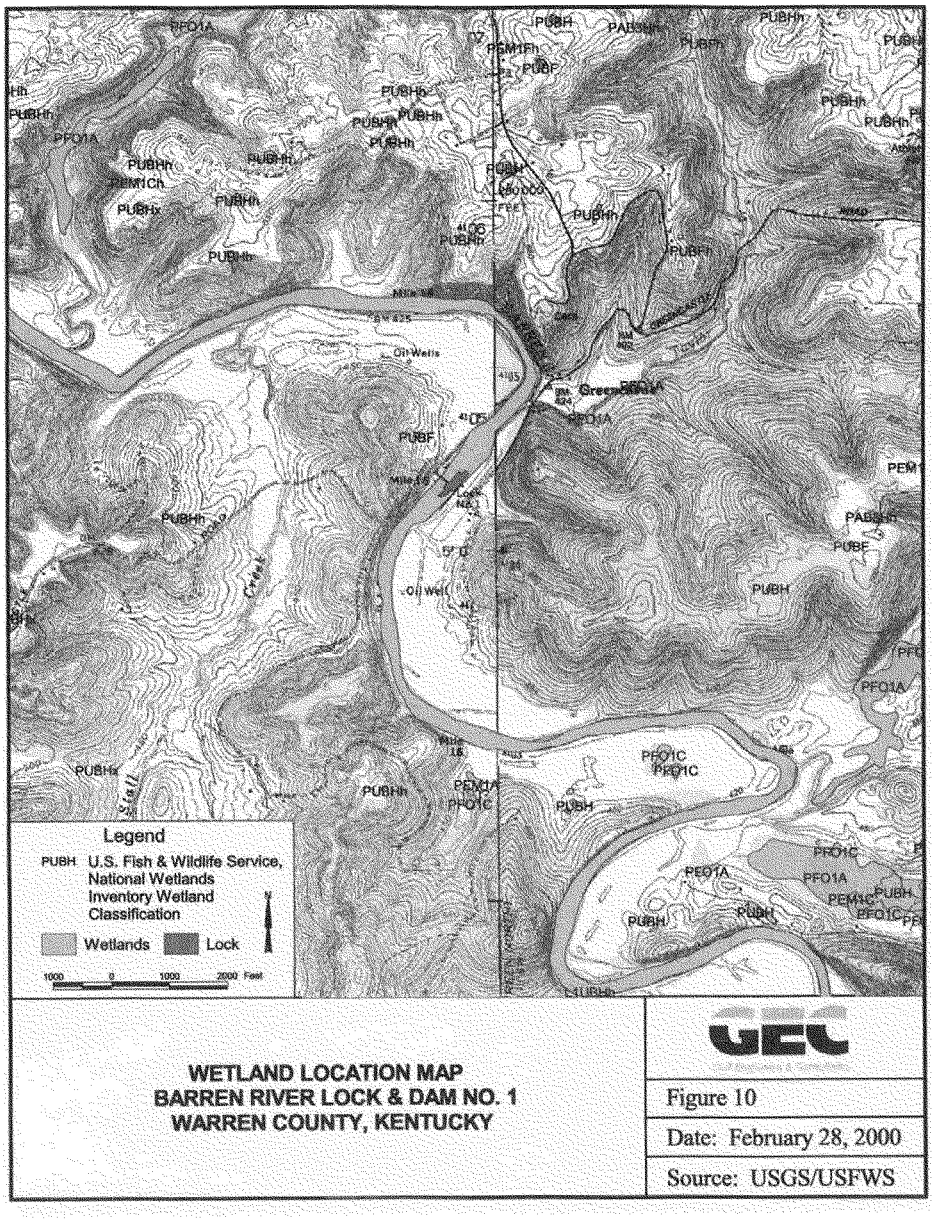


Figure 10. Wetland location map for Barren River Lock and Dam No. 1.

3.11 Cultural Resources

A review of records and files available in the Louisville District indicate a number of cultural resources in the general study area. For the purposes of this cultural resources overview, the general study area is defined as the area immediately adjacent to, or within 500 feet of, the extant banks of the Green and Barren rivers. This information was gathered from the National Register of Historic Places (NRHP), the Office of State Archaeology (OSA) and the Kentucky State Historic Preservation Office (KY-SHPO) primarily as a result of various preliminary environmental studies undertaken on the general area by the Corps of Engineers.

Based on this review the majority of the recorded sites within the general study area are prehistoric (N=57) in origin. The best known of the prehistoric resources would be the Green River Shell Middens of Kentucky, a multiple NRHP listing with sites in Butler, Henderson, McClean, Muhlenberg and Ohio counties. Historic era resources (N=44) such as farmsteads and riverboat, ferry, and wharf landings are also known within the general study area. Information on file with OSA indicates a likelihood of additional cultural resources in the general study area as the entirety of this area has not been systematically examined for cultural resources. A quantified summary of known cultural resources by pool reach is presented in Table 8.

TABLE 8. QUANTIFIED SUMMARY OF KNOWN CULTURAL RESOURCES ADJACENT TO POOLS OF GREEN RIVER LOCKS AND DAMS 2 (UPPER POOL), 3, AND 4, AND. BARREN RIVER (MOUTH TO BOWLING GREEN)

Pool	Prehistoric Sites	Historic Sites	Pool Total
Green River –Pool #2 (upper reaches only) (RM 102.5-108.5)	3	2	5
Green River - Pool #3 (RM 108.5-149.0)	30	24	54
Green River - Pool #4 (RM 149.0-168.1)	7	13	20
Lower Barren River (RM 0.0-15.0)	6	3	9
Barren River - Pool #1			

(RM 15.0-Bowling Green)	11	2	13
TOTALS	57	44	101

A Phase I cultural resources reconnaissance of the specific project area did not locate any of these previously recorded sites within the project. This reconnaissance undertaken in 1998 on the Government property associated with Locks and Dams 3, 4, 5, and 6 along the Green River and Lock and Dam 1 on the Barren River also encountered no new evidence of either prehistoric or undisturbed historic archaeological remains. Based on documentation of the history and architecture of these facilities completed in 2000, the lock and dam components are considered by the Louisville District to be eligible for listing on the NRHP as part of a navigation system. The KY-SHPO has concurred with the findings of the reconnaissance, the history/architectural documentation and that the lock and dam components are considered eligible for the NRHP.

3.12 Soils

Soils in the Green River Basin can be categorized into six associations: Frondorf-Wellston, Frondorf-Caneyville-Dekalb, Newark- Nolin-Lawrence, Zanesville-Sadler-Wellston, Fredonia-Pembroke, and Pembroke-Crider-Cumberland. All of these associations are localized regionally in conjunction with other associations with the exception of the Zanesville-Sadler-Wellston association which occurs at scattered locations throughout the project area. Frondorf-Wellston (broad ridge tops and steep side slopes), and the Newark-Nolin- Lawrence (low areas along the Green and Barren rivers and their tributaries) associations comprise the majority of the soils in the study area, and are found together throughout the central and western regions. The Frondorf-Wellston has a high potential for erosion and is not considered prime farmland in most areas, and the Newark-Nolin-Lawrence association is prone to wetness and flooding. The remainder of the associations occurs in the southern and eastern portion of the study area and occur in steeply sloped to rolling karst uplands. Frondorf-Caneyville-Dekalb, Zanesville-Sadler-Wellston, Fredonia-Pembroke, and Pembroke-Crider-Cumberland Associations are considered to have limited suitability for most crops, and erosion is a problem in some areas. Table 9 shows the physical characteristics of the soils association within the study area. U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) soil survey information was reviewed for each lock and dam. The majority of the soils mapped were Nolin series soils. Nolin series soils are generally well drained soils located in the flood plains and in upland depressions with slopes ranging from 0 to 4 percent. The Nolin series is

listed as a hydric soil in the *Hydric Soils of the United States, U.S. Department of Agriculture, Revised October 1990.*

Table 9. Soil Association Within the Five-County Study Area

Soil Association and Number	Characteristics			
	Slope	Drainage	Texture	Parent Material
7. Frondorf-Wellston	Mostly steep (up to 50%)	Good	Loamy	Formed in loam and loess over siltstone residuum.
8. Frondorf-Caneyville-DeKalb	Mostly steep (up to 50%)	Good	Loamy and clayey	Formed in siltstone, limestone, or sandstone residuums.
9. Newark-Nolin-Lawrence	Nearly level (0-2%)	Somewhat poor to good	Loamy	Formed in alluvium.
10. Zonesville-Sadler-Wellston	Nearly level to gently sloping (0-12%)	Moderately good	Loamy, most with fragipan	Formed in loess over siltstone and sandstone residuum.
11. Fredonia-Pembroke	Moderately steep to gently sloping (2-30%)	Good	Clayey, some are shallow	Formed in limestone residuum and loess.
12. Pembroke-Crider-Cumberland	Nearly level to sloping (2-12%)	Good	Loamy	Formed in thin loess over limestone residuum.

Source: U.S. Department of Agriculture.

4.0 ENVIRONMENTAL IMPACTS

4.1 Land Use

4.1.1 Alternative 1/No-Action

This is the No-Action Alternative. Under the No-Action Alternative, the property would remain in Government ownership and caretaker status. No change in adjacent land use or conflicts with adjacent uses is expected under this alternative.

4.1.2 Alternative 2

Alternative 2 includes disposition of Federal interests without any permanent alterations to the lock and dam structures. In order to deter access to the river side lock wall, the upstream and/or downstream miter gates would be gated with barricades on the land side miter gates. No change in adjacent land use or conflicts with adjacent uses is expected due to the addition of the barricades. Construction activities associated with installation of the barricades would cause temporary impacts in the form of increased noise levels in the immediate vicinity of the construction zone. These

impacts are described in more detail in Section 4.7, with mitigative measures outlined in Section 5.0. The increase in noise levels would be temporary and should not conflict with adjacent land uses.

Impacts to land use after disposition for all alternatives is mostly speculative, as it is not known who would take ownership of the sites. Currently, it is assumed that the Three County River Authority would purchase the Lock and Dam No. 3 site in order to protect water supply. Therefore, it would be expected that the structure would be maintained at its present condition.

At Lock and Dam No. 6, Mammoth Cave National Park would be expected to purchase 0.83 acres on the south side of the Green River after dam removal, as this land falls within the original authorized boundary for the Park. Butler County Museum, who currently maintains the land adjacent to the Lock and Dam No. 4 site, would likely continue to do so after disposition, resulting in no changes to land use. The counties surrounding Lock and Dam No. 5 have expressed interest in acquiring the site and using as park. Likewise, Warren County has expressed interest in acquiring the Barren River Lock and Dam No. 1 property to turn into park lands. For any of the alternatives discussed in this EA, there are no negative impacts to land use expected after the disposition of these sites.

4.1.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Alternative 3 includes disposition of Federal interests with dam removal and lock stabilization. Impacts described under Alternative 2 are expected to be the same as this alternative, except that opportunities for recreational development would be improved with the reductions in safety and liability concerns presented by the structures. Work would have to be done from a temporary construction access road built within the river channel. The access road would consist of dumped stone to build a raised access road and work platform in the river from which equipment could work. This road would also be removed after the dam; therefore no impacts to land use would be expected from this work. Impacts to land use from the disposition of federal interests itself are discussed under Alternative 2.

4.1.4 Alternative 4

Under this alternative, all the locks would be filled with riprap to stabilize the gates and to eliminate the hazard associated with falling into the locks. Additionally, at Green River Lock and Dam No. 3, a concrete plug would be placed against the upstream face of the upstream miter gates to help maintain pool. No change in adjacent land use, or conflicts with adjacent uses are expected under this alternative. Impacts to land use from the disposition of federal interests itself are discussed under Alternative 2.

4.2 Infrastructure

4.2.1 Alternative 1/No-Action

Under the No-Action Alternative, no significant impact to existing utilities or other infrastructure at Green River Lock and Dam Nos. 3 through 6 and Barren River Lock and Dam No. 1 are expected.

4.2.2 Alternative 2

Disposal of Federal interests after installation of barricades on the land side miter gates would not impact existing utilities or infrastructure at the sites. Refer to section 4.1.2 for the possible changes at each site after disposition. No negative impacts to infrastructure are expected after disposition for any of the alternatives.

4.2.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Removal of Green River Dam No. 6, and filling the lock would not significantly impact existing utility service or infrastructure within the Green or Barren rivers other than the Lock and Dam itself. The current, structurally compromised condition of Lock and Dam No. 6 presents risks to public safety inherent in the potential for uncontrolled breaching and downstream flooding. The location of the dam in a relatively remote area in a section of river now primarily used for recreation by canoeists, kayakers and other boaters also poses a safety risk to those boaters who are unaware of the hazards posed by the dam. Removal of the dam would permanently and completely eliminate these infrastructure safety risks. An embankment would need to be constructed within the river to access the dam for removal. The embankment would consist of dumped stone to build a raised access road and work platform in the river from which equipment could work. This embankment would also be removed after the dam, therefore no impacts to infrastructure would be expected.

4.2.4 Alternative 4

Disposal of Federal interests after lock stabilization and modification would not adversely impact existing utility service or infrastructure at the sites. The installation of the concrete plug at Green River Lock and Dam No. 3 would aid in maintaining the upstream pool. This would ensure continued access to the pool water for municipal water supply.

4.3 Socioeconomics

4.3.1 Alternative 1/ No-Action

Under the No-Action Alternative, the locks and dams would not be altered and the pools would be maintained at their current levels. Therefore, there should be no short-term or long-term changes in the socioeconomic conditions in the study area under No-Action.

4.3.2 Alternative 2

Under Alternative 2, barricades would be implemented on each of the miter gates of all locks. There would be no long-term changes in the socioeconomic conditions in the study area due to the implementation of Alternative 2.

The construction expenditures associated with Alternative 2 would result in beneficial short-term economic impacts to the region during the actual period of construction. Because of the rural nature of the study area, the impacts may be limited due to contract award, the availability of skilled and unskilled labor in the region, the availability of regional materials and equipment. It is assumed that, at a minimum, a portion of the direct labor and materials budgets would be expended in the region. This assumption is based on the belief that some of the labor would be hired locally and the materials, much of which is aggregate, would come from local sources.

Expending these resources within the regional economy could result in a temporary increase in employment, personal income and business activity. Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to socioeconomics are expected after disposition for any of the alternatives.

4.3.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Since Green River Lock and Dam No. 6 is located near Mammoth Cave National Park where most recreational facilities are located, it is reviewed separately in this assessment. The removal of Green River Lock and Dam No. 6 would impact the Houchin Ferry operation that is operated by the NPS in Mammoth Cave National Park. The plan would also affect canoeing on the Green River by removing a barrier to longer canoe trips and restoring a more natural flow regime for what is currently the Dam No. 6 pool.

Presently, the NPS has no plans to establish additional tours. No additional tourism revenue from increased cave access for the public would be realized under this alternative in the immediate future, but could occur long-term. It is likely that increased revenues would result from an increase in cave exploration and mapping activities by researchers and cartographers. It is also likely that some visitors and researchers would spend additional time in the Brownsville area to view the removal of the dam and to take hikes or canoe trips to examine the restored river channel as it returns to a natural condition.

Presently, the canoe liveries on the Green River serve canoeists wanting primarily half-day trips. Removal of the dam is expected to increase demand for multi-day canoe trips leading increased rentals and revenues for local businesses.

Two documents have addressed the potential popularity of canoeing in the study area. These are the January 1980 *Draft Environmental Assessment of Lock and Dam Six, Green River Navigation*

Project on Mammoth Cave National Park, prepared by the Cave Research Foundation and the August 1990 *Lock and Dam No. 6 on the Green River Compilation Paper and Annotated Bibliography*, prepared by Jeff Luoma. The 1980 document estimated an economic impact of $75,000 per year based upon an additional 500 to 1,000 canoe trips annually.

The NPS would continue operating its two ferries if Dam No. 6 was removed. The NPS has completed an environmental assessment of planned improvements that specifically addresses continued operation of the Green River Ferry during periods of low river levels. Because of these improvements, no detrimental impacts to the operation of the Green River Ferry are expected. Dam No. 6 is three miles downriver from Houchin Ferry and would require modifications to ensure continued operation.

Table 10 shows that Houchin Ferry is used for commuting, as well as park visitation. The Houchin Ferry is three miles upriver from the bridge in Brownsville. The NPS has clearly indicated to Louisville District personnel that there are no plans to close either ferry, as this would eliminate direct access to the northern half of the park from the Visitors Center and otherwise impede park operations.

Table 10. Houchin Ferry Traffic
(Monthly Average)

Traffic	FY 1998	FY 1999
Park Visitor	244	168
Local Traffic	525	411
Park Service Vehicle	115	43
TOTAL	884	622

Source: G.E.C., Inc., 2000.

Ferry operators take traffic counts of all boats in the Green River in Mammoth Cave National Park. The total count was 9,853 in 1997 and 9,151 in 1998. The removal of Dam No. 6 would not markedly affect boating businesses in the study area because there are two nearby Corps of Engineers lakes that are used for boating and fishing. Marinas and boating supply stores are located at Nolin River Lake and Barren River Lake. The slack water near Dam No. 6 is used for power boating almost exclusively by local residents.

Construction activities associated with the removal of the dam would create short-term impacts within the regional economy. The construction expenditures associated with Alternative 3 should result in beneficial short-term economic impacts to the region during the actual period of construction. Because of the rural nature of the study area, the impacts may be limited due to contract award, the availability of skilled and unskilled labor in the region, and the availability of materials and equipment. It is assumed that a portion of the direct labor and materials budgets would be expended in the region. This assumption is based on the belief that some of the labor would be hired from the local work force and the materials, much of which is aggregate, would come from local sources.

4.3.4 Alternative 4

Under Alternative 4, the locks would be stabilized and the water pools would be maintained at their current levels. Therefore, there should be no long-term changes in the socioeconomic conditions in the study area due to the implementation of Alternative 4. However, similar to Alternative 3 (although to a lesser extent) construction activities associated with the stabilization of the locks would create short-term impacts positive within the regional economy. Because of the rural nature of the study area, the impacts may be limited due to contract award, the availability of skilled and unskilled labor in the region, and the availability of regional materials and equipment. It is assumed that a portion of the direct labor and materials budgets would be expended in the region. This assumption is based on the belief that some of the labor would be hired locally and the materials, much of which is aggregate, would come from local sources.

4.4 Water Quality

4.4.1 Alternative 1/No-Action

Because no additional work on the facility is anticipated under this alternative, dam failure which occurred at Green River No. 4 is a possibility, although unlikely in the near future. Such failure and breaching would result in a reduction in pool levels. This could result in water quality degradation in the vicinity of the breached dam. If dam failure were to occur impacts would be similar to those described under Alternative 3.

4.4.2 Alternative 2

Under disposal with implemented barricades, it is anticipated that impacts to water quality would be the same as described under Alternative1/No-Action. Because no additional work is anticipated to the facility under this alternative, dam failure at which occurred Green River No. 4 is a possibility, although unlikely in the near future. Such failure and breaching would result in a reduction in pool

levels. This could result in water quality degradation in the vicinity of the breached dam. If dam failure were to occur impacts would be similar to those described under Alternative 3.

Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to water quality are expected after disposition for any of the alternatives.

4.4.3 Alternative 3 (Green River Lock and Dam No. 6 only)

With filling of the lock chamber under this alternative, minor impacts to water quality can be expected. During the removal of the Green River Dam No.6 under this alternative, temporary increases in turbidity would likely create short-term degradation of water quality downstream from the work sites. Following the dam removal, increased water flow in the pool area would likely re-suspend sediment from that area and for some period of time result in increased turbidity and total suspended solids downstream. Over time, this process would result in a redistribution of the sediment, as fine sediment would be picked up by the increased current and carried the farthest before settling out. Increased water velocity in the pool areas would also likely result in increased aeration and higher dissolved oxygen levels. Most sediment capable of re-suspension would be picked up from the pool areas above the dams within the first one to two years after removal and redistributed downstream creating a more natural bed elevation throughout the channel. Upon reaching this state of equilibrium, stream water quality should stabilize at conditions somewhat better than the existing levels. According to the Clean Water Act (CWA), a 404(b)(1) evaluation must be completed for any project proposing fill be place into Waters of the U.S. This analysis can be found in Appendix A of this document. Refer to Section 8.0 of this report for information on compliance other environmental laws.

Increased velocities of groundwater flow toward the river as well as changes in the hydrologic patterns of underground streams in the Mammoth Cave system may result. A decrease in groundwater elevation in the Mammoth Cave system is anticipated to be beneficial, as this would expose previously documented, and possibly some undocumented, passages for exploration and study. The lowering of Green River Pool No. 6 is expected to allow the River Styx to once again flow out of Mammoth Cave into the Green River. This effect would greatly reduce the period of flow into the cave from the river, consequently reducing flooding and sedimentation within cave passages.

4.4.4 Alternative 4

Minor impacts to water quality under Alternative 4 are expected at all lock and dams. Because all locks are accessible to highway-transported construction equipment, it is expected that impact to water quality in the rivers would be minimal under Alternative 4. Some minor temporary increases in

turbidity may result from the filling of the locks and modifications to the lock gates, should that be necessary. However, the increased turbidity is expected to be of a short-term nature and is not anticipated to significantly degrade water quality in the Green River. Stream water levels are not expected to be significantly affected under this alternative, therefore no impacts on groundwater are anticipated.

4.5 Air Impacts

4.5.1 Alternative 1/No-Action

Under this alternative, local and regional air quality would not be impacted. There would be no change to attainment status.

4.5.2 Alternative 2

This alternative has no action included that would affect air quality within the project area. There would be no change to attainment status. Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to air quality are expected after disposition for any of the alternatives.

4.5.3 Alternative 3 (Green River Lock and Dam No. 6 only)

This alternative is not expected to result in a significant impact to air quality. During stabilization operations, the filling of lock chamber, dam removal and other construction activities may cause a temporary increase in fugitive dust emissions and motorized construction equipment would contribute temporary additional exhaust emissions to the localized area. However, neither of these emission sources is expected to cause a significant degradation in air quality. There would be no change to attainment status. Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to air quality are expected after disposition for any of the alternatives.

4.5.4 Alternative 4

Under this alternative, local and regional air quality would not be impacted. There would be no change to attainment status. Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to air quality are expected after disposition for any of the alternatives.

4.6 Noise

4.6.1 Alternative 1/No-Action

Under the No-Action Alternative, properties would remain in Federal ownership. No new noise sources are anticipated under this alternative.

4.6.2 Alternative 2

Alternative 2 includes the disposition of Federal interests with installation of barricades to reduce safety hazards. There is no potential for permanent noise sources with increases in noise levels under this alternative.

Construction activities associated with installing the barricades would cause temporary increases in noise levels in the immediate vicinity of the construction zone. Noise levels in the immediate area of construction equipment powered by internal combustion engines generally range from 70 dBA (pumps) to a high of approximately 95 dBA (tractors, trucks, bulldozers, etc). Increased noise would occur in close proximity to the equipment and would not affect residential areas or other sensitive receptors. Further, the increase in noise levels would be temporary and would not be considered significant. Abatement measures that can be implemented during construction are included in Section 5.0. Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to noise are expected after disposition for any of the alternatives.

4.6.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Alternative 3 includes the disposition of Federal interests with removal and lock stabilization of Green River Lock and Dam No.6. The potential for new intermittent sources of noise does exist. The most likely permanent noise sources would be those associated with a recreational use of the property, such as a campground, or possibly a boat rental/convenience store, and would not be considered significant or in conflict with existing conditions.

Construction activities associated with dam removal would cause temporary increases in the noise levels in the immediate vicinity of the construction zone. Noise levels from construction equipment powered by internal combustion engines generally range from 70 dBA (pumps) to a high of approximately 95 dBA (tractors, trucks, bulldozers, etc). The increase in noise levels during construction would be temporary and would not be considered significant. Abatement measures that can be implemented during construction are included in Section 5.0.

4.6.4 Alternative 4

Under this alternative, each lock would be filled with riprap and a concrete plug would be placed in front of the miter gates and Green River Lock and Dam No. 3. Impacts associated with this alternative are expected to be similar to those described in Alternative 3.

4.7 Hazardous/Toxic Materials

4.7.1 Alternative 1/No-Action

Under the No-Action Alternative, the properties would remain in caretaker status with no additional work performed. Therefore, this alternative is not expected to result in the release of hazardous or toxic materials to the environment.

Small amounts of chipped and cracked paint were observed at each site on fittings associated with the locks and on various other structures. There appear to be no asbestos concerns at any of the properties except Green River Lock and Dam No. 3, where possible asbestos containing material, in the form of ceiling tiles, was observed in the former residence. The negligible amount of paint and possible asbestos containing material (ACM) does not pose significant risk, and therefore would not be removed if the properties remained in caretaker status. If desired, removal of these materials would be conducted in accordance with state and local regulations.

4.7.2 Alternative 2

Some indications of the presence, or potential presence, of hazardous or toxic materials were noted at almost all of the properties surveyed during the EBS. However, based on the information reviewed and physical observations, there is no evidence that significant amounts of hazardous materials were ever stored, handled, transported, disposed, or otherwise released at any of the locks and dams within the study area. Therefore, the proposed action under this alternative is not expected to result in the release of hazardous or toxic materials to the environment.

Impacts described under Alternative 1 would be the same under this alternative, with the following exceptions. Construction activities associated with installing barricades would have a slight potential for release of hazardous or toxic materials into the environment in the form of spills or leaks of fuels or lubricants utilized by construction machinery. This potential is lesser than that of Alternatives 3 and 4 and would be minimized by following best management practices to reduce any exposure of pollutants. More on these practices can be found in Section 5.2.

4.7.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Anticipated impacts under this alternative would likely be the same as those described under Alternatives 1 and 2. Bottom sediments in the dam pools would be re-suspended by the increased current; however, no release of hazardous or toxic materials to the environment is expected from this re-suspension. Sediment accumulations at Lock and Dam No. 3 were obtained and analyzed in 2010 (Stantec Consulting Services Inc. 2010). Other than arsenic (to be discussed below), all constituents tested at non-detectible levels, or at levels that were 1 to 4 orders of magnitude (i.e., 10 to 10,000 times) below the residential soil Preliminary Remediation Goals (PRGs).

The nine arsenic tests produced two non-detect (less than approximately 0.53 mg/kg) results and detected levels of 1.06 to 3.97 mg/kg. The residential soil PRG for arsenic is 0.39 mg/kg. Such

results are not unusual for Kentucky soils, which have ambient background levels of arsenic higher than those typically found in USEPA Region 9 (California, Nevada, Arizona, Hawaii) where the PRGs were developed and subsequently adopted by Region 4 (Kentucky, Tennessee, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina). The State of Kentucky developed a procedure to compare site specific findings in Kentucky against "generic statewide ambient background" levels of various constituents. Various statistical tests can be applied to compare site data to the generic background data. For arsenic levels to be considered background, the mean of the site data must be less than 9.4 mg/kg, 50% of the site data must be less than 8.3 mg/kg, and all site data must be less than 21.2 mg/kg (Natural Resources and Environmental Protection Cabinet 2004). The arsenic results for Green River Lock and Dam No. 3 meet all three of the above criteria, and thus the results are considered within normal background levels for Kentucky soils.

It is not anticipated that soils above Dam No. 6 will require testing since the samples from further downstream at Lock and Dam no. 3 were not problematic. It is assumed that soils upstream of Lock and Dam No.3 would be less likely to accumulate harmful constituents due to the decreasing size of watershed area.

4.7.4 Alternative 4

Anticipated impacts under this alternative would likely be the same as those described under Alternative 3, except that because no dams would be removed, any unforeseen impacts from the disturbance of bottom sediments associated with Alternative 3 are not at issue for Alternative 4.

4.8 Biological Resources

4.8.1 Alternative 1/No-Action

Under the No-Action Alternative, no changes are expected to the terrestrial fauna or flora. Short-term benefits in the form of sediment trapping and gradual sediment release during low flows are expected. However, because no additional work is anticipated under this alternative, dam failure as has occurred at Green River Dam No. 4 is a possibility, although unlikely in the near future. Such failure and breaching would result in a reduction in pool levels. In turn, the aquatic biota would shift from that dominated by pool species to that dominated by free-flowing species.

4.8.2 Alternative 2

Alternative 2 involves the disposal of Federal properties at Green River Lock and Dam Nos. 3 through 6, and Barren River Lock and Dam No. 1 with the installation of barricades on the each of the miter gates. No additional construction or maintenance would occur. Under this Alternative, no changes are expected to the terrestrial fauna or flora. However, as no additional work on any facility

is anticipated under this alternative, dam failure as has occurred at Green River No. 4 is a possibility, although unlikely in the near future. Such failure and breaching would result in a reduction in pool levels. In turn, the aquatic biota would shift from that dominated by pool species to that dominated by free-flowing species.

Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to biological resources are expected after disposition for any of the alternatives.

4.8.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Alternative 3 would involve the removal of Lock and Dam No. 6 on the Green River and the stabilization of the associated lock. Lock stabilization activities may temporarily disrupt wildlife patterns in the immediate vicinity of the locks, but no significant effects on terrestrial wildlife are expected under this alternative. Short term aquatic impacts are expected in the form of increased turbidity downstream of the stabilization. This is not expected to alter the aquatic community, or habitat. Implementation of this alternative is not likely to adversely affect federally threatened or endangered species or existing habitat.

Dam removal would likely involve construction of a temporary embankment or access road that would be used for demolition and hauling debris from the site. Construction activities may temporarily disrupt wildlife patterns in the immediate vicinity of locks and dams, but no significant effects on terrestrial wildlife are expected. The aquatic community would be the most affected by this alternative. Removal of the dams would change river characteristics from lentic (still waters such as lakes, and ponds) to lotic (actively moving water). It is expected that the dams would be removed in a manner to encourage a slow drawdown rather than a rapid drawdown.

Short-term impacts associated with dam removal would be an increase in turbidity and sediment load during construction. Some stream bank erosion may occur with the lowering of the water levels. However, once vegetation becomes established along the exposed portions of the bank, erosion would be minimized. Short-term water quality impacts are expected to be of shorter duration with the notching process, as compared to full dam removal.

Long-term impacts would be beneficial to the aquatic community. Removal of the dam would restore approximately 17 miles of natural river habitat. Lock and Dam No. 4 on the Green River once maintained a pool 22 miles long. However, since this dam was breached, free-flowing conditions and riffles have become reestablished.

Species composition would change to the more natural community present above Pool 6 on the Green River. Smallmouth bass numbers would likely increase as largemouth bass numbers would likely decrease. Kentucky bass populations would not likely be significantly affected. As

recolonization by pre-project fish species occurs, those fish species that serve as hosts for glochidia of freshwater mussels would increase the potential for recolonization of restored riverine habitats by mussels (USFWS, 1999). Implementation of Alternative 3 would likely have long-term beneficial impacts to threatened and endangered mussels and their habitat. The endangered aquatic species present in the project area evolved in free flowing water not impounded streams. Removal of the dams and flushing of accumulated sediments would re-expose gravel bars within the channel, which could then be recolonized by mussels and other aquatic species.

The Kentucky cave shrimp and its habitat would also benefit from the removal of Dam No. 6 on the Green River which would restore free flow out of Mammoth Cave. Restoring this area to near pre-project conditions would reduce the potential for sediment accumulation in the subterranean passages of Mammoth Cave and enhance habitat for the endangered Kentucky cave shrimp, the northern and southern cavefish, and crayfish. The endangered Indiana bat and gray bat would also gain potential hibernacula and maternity sites, as water elevations drop and open additional cave passages or entrances openings within Mammoth Cave National Park. The return to more naturally occurring water levels would also benefit microclimatic conditions within the cave system thereby benefiting many cave dwelling organisms.

Through consultation with the USFWS, it was determined there is no need for the USACE to prepare a Biological Assessment (BA) regarding potential impacts to threatened and endangered species at this time. In a letter to USACE dated April 7, 2014, the USFWS explained the reasoning for this determination which included that "(a) no adverse effects on federally listed species can be tied to the Corps' preliminary selection of preferred alternatives for each of the facilities, and (b) the specific project actions that would be implemented at each of the facilities and resulting effects on federally listed species cannot be accurately determined based on the information currently available." Before implementation of the chosen alternative, the USACE will prepare a BA and make effects determinations for federally listed species in the action area, while continuing subsequent consultation with the USFWS.

4.8.4 Alternative 4

This alternative would involve the stabilization locks Nos. 6 on the Green River. Additionally, a concrete plug would be constructed on the upstream face of the upper miter gates of Lock No. 3 to help preserve the pool over the long term. Very limited removal of vegetation would be required around the upstream miter gate. This vegetation currently does not offer viable habitat for threatened or endangered species. Temporary disruption of wildlife patterns may occur during construction activities associated with filling the lock chambers, however, no significant terrestrial affects are

expected from this activity. Short term aquatic impacts are expected in the form of increased turbidity downstream of the stabilization. This is not expected to alter the aquatic community, or habitat. However, as with Alternative 3, consultation with the USFWS is being conducted regarding the potential impacts to threatened and endangered mussels within the project area.

4.9 Wetlands and Floodplains

4.9.1 Alternative 1/No-Action

Under the No-Action Alternative, no work in waters of the U.S. including wetlands is proposed. The No-Action Alternative would not significantly affect wetlands. However, because no additional work is anticipated under this alternative, dam failure is a possibility, although unlikely in the near future. Such failure and breaching would result in a reduction in pool levels. In turn, latent seed banks would be exposed as the water level drops. Native plants would soon begin to grow on the newly exposed riverbank, likely increasing wetland habitat. 4.9.2 Alternative 2

Alternative 2 involve disposition of Federal interests with barricade installation on each miter gate. No work in waters of the U.S. including wetlands is proposed. Alternative 2 would not significantly affect wetlands. However, because no additional work is anticipated under this alternative, dam failure is a possibility, although unlikely in the near future. The impacts to wetlands would be the same as those described in Section 4.9.1. Refer to section 4.1.2 for possible changes at each site after disposition. No negative impacts to wetlands and floodplains are expected after disposition for any of the alternatives.

4.9.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Alternative 3 involves disposition of Federal interests with removal of Green River Dam No.6 and stabilization the associated lock. The NWI maps showed no wetlands landward of the government owned properties at Lock and Dam Nos. 3 through 6 along the Green and Barren River Lock and Dam No. 1 with the exception of a small linear band of wetlands running the length of the rivers on both banks. The only additional areas potentially classified as wetlands on Government at Barren River Lock and Dam No. 1. A small (less than one acre) palustrine forested wetland dominated with red maple was observed upstream of the lock on the right descending bank. Positive impacts to the streamside wetlands would be expected under this alternative. Latent seed banks would be exposed as the water level drops after dam removal. Native plants, including sycamore, cottonwood, water maple, box elder, and willow trees, would soon begin to grow on the newly exposed riverbank, likely increasing wetland habitat. There is potential for invasive plant species to initially propagate the exposed stream banks.

Dam removal would likely involve construction of a temporary embankment, or access road, which would be used for demolition and hauling debris from the site. Construction of the embankment/access road would require clearing in the linear band of wetlands adjacent to the Green Rivers, as well as the deposition of fill material in waters of the U.S. including wetlands. Impacts would be localized and temporary, as the areas would be restored upon completion of dam removal. Although these impacts are considered temporary, an evaluation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act was completed as required prior to any discharge of fill material in jurisdictional waters. No long-term significantly adverse impacts are expected on wetlands or floodplains under this alternative.

Upon completion of dam removal and removal of the temporary construction embankment/access road, water levels in the Green River affected by Dam No. 6 would drop to near pre-dam levels. This would result in the exposure of additional lands within and directly adjacent to the channel. Additional emergent wetlands would form along the Green and Barren rivers. Further, wetland classification would likely change to a riverine system with a lower perennial subsystem with an unconsolidated bottom and a permanently flooded water regime.

4.9.4 Alternative 4

Alternative 4 involves disposition of Federal interests with lock stabilization and the installation of concrete plug at Green River Lock and Dam No. 3. Construction vehicles would utilize existing roads for hauling materials to and from sites. This alternative would require the deposition of fill material in waters of the U.S. Impacts would be localized and temporary as the areas would be restored upon completion of dam removal. Although these impacts are considered temporary, an evaluation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act was completed as required prior to any discharge of fill material in jurisdictional waters. No long-term significantly adverse impacts are expected on wetlands or floodplains under this alternative. This alternative could prevent potential beneficial impacts to wetlands or floodplains because it would prevent or delay the eventual failure of the lock, but it would have no significant adverse effects on the existing wetlands or floodplains in the area.

4.10 Cultural Resources

4.10.1 Alternative 1/No-Action

Under the No-Action Alternative the federal government would retain ownership of and responsibility for Green River Lock and Dam Nos. 3 through 6, and Barren River Lock and Dam No. 1. No deterioration affecting the National Register of Historic Places (NRHP) eligibility of these

facilities has been noted since 2004. No project related alterations would be done to the facilities under the No-Action Alternative. Therefore there would be no impacts to cultural resources from the project.

4.10.2 Alternative 2

Under Alternative 2 barricades would be installed on the land side miter gates of Green River Locks and Dams Nos. 3 through 6 and Barren River No. 1 locks and then disposal of Federal interests in the facilities would occur. No prehistoric or historic archaeological sites would be affected by these actions. However, this alternative would have an effect to the locks and dams. The Kentucky State Historic Preservation Officer (KY-SHPO) has commented that the proposed disposition of Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 would have an adverse effect on these NRHP eligible properties. Transfer from Federal ownership is considered an adverse effect. Further consultation with the KY-SHPO and other interested parties would be undertaken. The focus of consultation would be to determine appropriate mitigation measures for inclusion in a Memorandum of Agreement to address project effects. Development of a Memorandum of Agreement would be completed prior to implementation of this alternative.

4.10.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Under Alternative 3, dam removal would occur at Lock and Dam No. 6, measures would be taken as needed to ensure the structural integrity and safety of the remaining facility elements and then disposal of Federal interests in the facilities would occur. Temporary placement of an access road would occur for dam removal. No prehistoric or historic archaeological sites would be affected by these actions. However, this alternative would have an effect to the lock and dam. The KY-SHPO has commented that the proposed disposition of Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 would have an adverse effect on these NRHP eligible properties. In accordance with 36 CFR 800.5(a)(2)(vii), transfer from Federal ownership is considered an adverse effect. Further consultation with the KY-SHPO and other interested parties would be undertaken. The focus of consultation would be to determine appropriate mitigation measures for inclusion in a Memorandum of Agreement to address project effects. Development of a Memorandum of Agreement would be completed prior to implementation of this alternative.

4.10.4 Alternative 4

Under Alternative 4, measures would be taken as needed to ensure the structural integrity and safety of Green River Locks and Dams Nos.3 and 6 and then disposal of Federal interests in the facilities would occur. No prehistoric or historic archaeological sites would be affected by these actions. However, this alternative would have an effect to the locks and dams. The KY-SHPO has

commented that the proposed disposition of Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 would have an adverse effect on these NRHP eligible properties. In accordance with 36 CFR 800.5(a)(2)(vii), transfer from Federal ownership is considered an adverse effect. Further consultation with the KY-SHPO and other interested parties would be undertaken. The focus of consultation would be to determine appropriate mitigation measures for inclusion in a Memorandum of Agreement to address project effects. Development of a Memorandum of Agreement would be completed prior to implementation of this alternative.

4.11 Soils

4.11.1 Alternative 1/No-Action

Under the No-Action Alternative, no additional work would be conducted which may impact soils in the area. Dam failure, as has occurred at Green River No. 4, is a possibility, although unlikely in the near future. Such failure and breaching would increase the potential for bank sloughing and erosion associated with rapid changes in water levels, especially if the surrounding soil is already saturated. These impacts would be localized and insignificant.

4.11.2 Alternative 2

Impacts to soils caused by the implementation of this alternative are the same as those described for Alternative 1/No Impact. Refer to section 4.1.2 for possible changes to land use at each site following disposition. No negative impacts to soils are expected after disposition for any of the alternatives.

4.11.3 Alternative 3 (Green River Lock and Dam No. 6 only)

Construction activities associated with dam removal and lock stabilization would involve the redistribution of soils during construction and installation of the temporary embankment/access road. Work directly adjacent to the riverbanks could result in some erosion or bank sloughing, but these impacts should be temporary and would be alleviated once the embankment/access road is removed. The proposed method of dam removal would involve a gradual drawdown of the pool. This would reduce the potential for bank sloughing and erosion associated with rapid changes in water levels. Best management practices during construction should reduce the potential for erosion or bank sloughing. No significant impacts to soils are expected under this alternative.

4.11.4 Alternative 4

Construction activities associated with stabilizing the locks and constructing a concrete plug would involve the redistribution of soils during construction. Work directly adjacent to the riverbank at Green River Lock No. 3 could result in some erosion or bank sloughing, but these impacts should be temporary and would be alleviated once construction is completed. Best management practices

during construction should reduce the potential for erosion. Implementation of Alternative 4 would not cause changes in water levels. No significant impacts to soils are expected under this alternative.

4.12 Environmental Justice

On February 11, 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. The purpose of this order is to avoid the disproportionate placement of any adverse environmental or economic impacts from Federal policies and actions on minority or low-income populations. The executive order required that any significant adverse impacts of the project or alternatives on minority or low-income populations be addressed.

Table 11 presents 2010 U.S. Census Data for communities in the vicinity of the locks and dams.

Table 11. 2010 U.S. Census Data for Communities in the Vicinity of Locks and Dams

Lock and Dam	Census Unit	Racial Composition	Poverty Status
Green River No. 3	Rochester (City)	98.9% White	13.7% Below Poverty Level
Green River No. 4	Woodbury (City)	100% White	64.4% Below Poverty Level
Green River No. 5	Warren Co. - North	99.3% White	16.0% Below Poverty Level
Green River No. 6	Brownsville (City)	97.1% White	27.7% Below Poverty Level
Barren River No. 1	Warren Co. – Greencastle	98.8% White	16.6% Below Poverty Level

Source: 2010 U.S. Census Bureau

As described in the previous sections of the EA, there are no significant environmental impacts associated with any of the various alternatives to which either minority or low-income families might be subjected. Because relatively few minority persons live in the vicinity of the locks and dams, unforeseen impacts associated with the alternatives would not present any disproportionate adverse effect. The census data indicate that even though there is a relatively large proportion of the population below the poverty level, the distribution of these persons appears not to be clustered, but generally dispersed. Therefore, any possible unforeseen impacts of the alternatives would not affect this portion of the local populace disproportionately.

5.0 ABATEMENT MEASURES

5.1 Noise

The construction contractor would adhere to the following abatement measures to minimize potential noise impacts associated with alternatives 2, 3, and 4:

- Maintain and operate equipment to minimize noise.
- Equip engines with properly functioning mufflers
- Limit activity near noise sensitive areas so as not to disrupt normal activities.

Should complaints arise due to construction noise, the following additional abatement measures may be considered:

- Install portable acoustic barrier around stationary construction noise sources.
- Shut off idling equipment.
- Notify nearby residents whenever extremely noisy work would be occurring.
- Schedule noisy construction operations near the middle of the day.
- Locate stationary construction equipment as far from nearby noise sensitive receptors as possible.

5.2 Hazardous/Toxic Materials

5.2.1 Alternative 2

Implementation of best management practices for spill prevention and containment during construction of barricades would reduce the potential for hazardous or toxic materials to be released to the environment.

5.2.2 Alternative 3

Implementation of best management practices for spill prevention and containment during construction would reduce the potential for hazardous or toxic materials to be released to the environment. These practices describe methods of minimizing exposure of pollutants to the river by enclosing any drips, overflows, leaks, and other liquid material releases or by isolating pollutant spills from the river or stormwater runoff. There are numerous spill containment methods, ranging from large structural barriers to simple, small drip pans. The benefits vary based on cost, maintenance requirements, and the size of spill control. Three possible options are discussed below:

Containment Diking: Temporary or permanent polyurethane or plastic berms, concrete berms, or retaining walls designed to hold spills. Diking is one of the best protective measures against stormwater pollution because it surrounds the area of concern and holds the

spill, keeping spill materials separated from the stormwater outside of the diked area. Diking is one of the most common types of spill containment.

Curbing: Like containment diking, curbing is a barrier that surrounds an area of concern. It prevents spills or leaks from being released to the environment by routing runoff to treatment or control areas. The terms "curbing" and "diking" are sometimes used interchangeably, but curbing is usually small scale and cannot contain large spills like diking can. As with diking, common materials for curbing include earth, concrete, synthetic materials, metal, or other impenetrable materials. Asphalt is also a common material used in curbing.

Drip Pans: Pans used to contain very small volumes of leaks, drips, and spills. Drip pans can be depressions in concrete, asphalt, or other impenetrable materials, or they can be made of metals, plastic, or any material that does not react with the dripped chemicals. Empty or discarded containers may be used as drip pans. Catch drips so that the materials or chemicals can be cleaned up easily or recycled before they can contact storm water. Drip pans can be a temporary or permanent measure.

Prior to any disturbance of bottom sediments upstream of the dams, sediment samples would be obtained and analyzed in accordance with state and Federal requirements. Any further testing or remedial action would also be performed in accordance with those same requirements.

5.2.3 Alternative 4

Implementation of best management practices for spill prevention and containment during construction covered in Section 5.2.2 would reduce the potential for hazardous or toxic materials to be released to the environment.

5.3 Biological Resources

The following measures should minimize the temporary impacts associated with construction activities under alternatives 2, 3, and 4:

- Prior to construction of any temporary embankment/access road within the Green and Barren rivers, a mussel investigation in the proposed area of construction should be performed with the results forwarded to the USFWS for review.
- Remove dams in a manner that facilitates a gradual drawdown of the pools.

5.4 Water Quality

The removal of the dams under Alternative 3 would likely result in short-term increases in turbidity and suspended solids due to the increased flow velocity and erosion of accumulated sediments. The lowering of pool water levels may also change the hydrology of nearby underground streams and

other groundwater flow. As a means of reducing impacts to water quality and the potential problems caused by decreases in pool levels, a phased approach to the dam removal and dam notching and subsequent lowering of pool levels is under consideration.

5.5 Soil Erosion

Best management practices, such as placement of silt fences, sediment traps, hay bales, etc. would be utilized to reduce runoff from construction activities associated with Alternatives 3 and 4. Additional erosion control measures may need to be taken after completion. This may include measures such as seeding, sodding, or riprap placement on steep slopes.

5.6 Safety

During the course of the recent site visits to each lock and dam, the Project Delivery Team explored measures other than filling the lock chambers to address safety at the lock and dam sites. While filling the lock chambers does reduce some risk associated with the vertical walls at the sites, injuries associated with unauthorized entry upon the properties could still be possible. Other actions can be implemented at the lock chambers, such as providing egress from the chambers or installing barricades on the land side miter gates that are expected to mitigate safety hazards at a reduced cost. The proposed plan would add barricades at each site to prevent foot traffic on the miter gates. During initial site inspections, it was determined that egress was currently possible from each chamber. This potential for egress would not be adversely affected by implementation of any of the proposed alternatives.

The current, structurally compromised condition of Lock and Dam No. 6 presents risks to public safety inherent in the potential for uncontrolled breaching and downstream flooding. The location of the dam in a relatively remote area in a section of river now primarily used for recreation by canoeists, kayakers and other boaters also poses a safety risk to those boaters who are unaware of the safety hazards posed by the dam. Removal of the dam would permanently and completely eliminate these infrastructure safety risks.

6.0 DETERMINATION

6.1 Preferred Alternative

Existing conditions vary at each of the lock and dam sites due to factors including, but not limited to: age and physical condition of the structures, plant growth and build-up of sediment, and the current and planned future use of the pool. Because of this site-to-site variation, each lock and dam was

essentially evaluated as a standalone project and the preferred alternatives differ between sites. The following section details witch alternative is preferred at each site.

6.1.1. Green River Lock and Dam No.3

Structurally, the lock and dam system looks sound and, except for the downstream guide wall, does not appear to be in any danger of imminent failure. The site investigation did not reveal any conditions at this structure which would result in the loss of pool in the foreseeable future. Therefore, no repair actions are considered necessary prior to disposition.

However, to maintain pool over the long term for municipal water supply, a concrete plug would be placed against the upstream face of the upstream miter gates (Alternative 4.) This would require some sediment and vegetation removal and sheet piles driven upstream of the miter gates. These would serve as the upstream formwork for the concrete plug. The miter gates themselves could be used as the downstream forms. The height of the concrete plug would be equal to that of the dam. In addition, to mitigate safety hazards on the dam side lock wall, the upstream and downstream miter gates would be gated off with barricades on the land side miter gates.The accumulated silt and vegetation within the chamber is substantial enough to act as a means of egress. It is expected for the sediment to continue to collect in the lock chamber provided the upstream and downstream miter gates remain closed/mitered.

6.1.2. Green River Lock and Dam No.4

Structurally, the lock and downstream guide wall do not appear to be in any danger of failure. No conditions were observed at the site which would further impair the stability of this structure. To mitigate safety hazards on the river side lock wall, the upstream and downstream miter gates would be gated off with barricades on the land side miter gates (Alternative 2). Accumulated silt and vegetation in the chamber is substantial enough to acts as a means of egress along with the deterioration of the lower downstream miter gates. Sediment is expected to continue to collect in the lock camber provided the upstream and downstream miter gates stay in place.

6.1.3. Green River Lock and Dam No.5

No conditions were observed at this site which would result in the loss of pool in the foreseeable future. The condition of the miter gates appears to be satisfactory. The pool formed by Dam No. 5 is used as a municipal water supply source, so maintaining the pool is of great importance for surrounding communities. If the upper set of miter gates were to fail, the lower set would provide the redundancy needed to maintain the pool until a fix (rock plug, sheet pile cut off, etc.) could be effected on the upstream end of the lock and. To mitigate safety hazards on dam side lock wall, the upstream and downstream miter gates would be gated off with barricades on the land side miter gates

(Alternative 2) and ensure the land side valve pits and bulkhead slots grates are bolted securely. Accumulated silt and vegetation in the chamber is substantial enough to acts as a means of egress. Sediment is expected to continue to collect in the lock chamber provided the upstream and downstream miter gates remain closed.

6.1.4. Green River Lock and Dam No.6

No work would be done to the miter gates, as they would not be needed to help maintain pool. The dam would be demolished and removed from the river (Alternative 3). This would be accomplished by constructing a road just upstream of the dam to enable equipment to gain access to the dam from the lock side. The dam would be slowly breached on the side furthest from the lock. The material would be removed from the dam gradually. Debris from the demolition would be placed in the lock chamber and along the lower approach wall and the associated steps to help minimize disposal costs and environmental impacts and mitigate safety hazards. As the dam is breached, the access road would be removed, as well. The stone used to construct the access road would also be placed in and around the lock chamber and lower approach. Egress for this structure is not an issue since the downstream gates have been removed.

In addition to work at the site of the lock and dam, modifications would also be made at the Houchin Ferry site in the area of the former L&D 6 pool. At this site, the concrete approach ramps would be extended to ensure continued operation during low water events.

6.1.5. Barren River Lock and Dam No.1

No conditions were observed at this site that would result in the loss of pool in the foreseeable future. The condition of the miter gates appears to be satisfactory. If the upper set of miter gates were to fail, the lower set would provide the redundancy needed to maintain the pool for potential future water supply until a fix (rock plug, sheet pile cut off, etc.) could be effected on the upstream end of the lock. To mitigate safety hazards on dam side lock wall, the upstream and downstream miter gates would be gated off with barricades on the land side miter gates (Alternative 2). Additionally, the land side valve pits and bulkhead slots grates would be inspected to ensure that they are bolted securely. Egress from the lock chamber is available by the following means: ladders located on the lock walls; vegetation and concrete berm just downstream of upstream miter gates; and accumulated sediment located near the miter gates.

7.0 Cumulative Impacts

Cumulative impacts are defined under section 1508.7 of CEQ as: "...the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person

undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." The following paragraphs summarize the cumulative impacts expected from the proposed project.

Construction of the Green and Barren Rivers lock and dam system has caused significant negative environmental impacts to the area over time. The dams have interrupted the natural hydrologic regime of the river, creating habitat that is not necessarily preferred by native species. This has resulted in a decline in these species' populations even to the point of extinction in some cases.

The most important stretch of the river ecologically is the stretch in the Mammoth Cave National Park. By removing Green River Dam No. 6, natural flow would be restored to the most sensitive reach in the river. The most environmental benefits could be gained in that location, considering impacts to threatened and endangered species, the restoration of natural river conditions in the cave, the ability for bats to fly in and out of the cave in locations they had not been able to use for over 100 years. The Green River, which meanders through the park, supports an unusual diversity of fish, including five species that have not been found anywhere else in the world, and three species of cavefish. Another group of aquatic animals, freshwater mussels, survive in the sand and gravel of the Green River. Over 50 species of mussels, including at least three on the endangered species list, live in the park. About 94% of the Green River Lock and Dam No. 6 pool is in the National Park. Restoration of the river to its preimpoundment state would not only benefit the species in the river, but would restore natural hydrologic conditions to Mammoth Cave. Since the development of cave passages is dependent on the movement of water, cave development has been arrested to a degree by the transformation of the free-flowing river to a static pool.

By leaving Dams 3, 5 and 1, social impacts would be minimized, there would be no negative environmental impacts (although some speculative beneficial environmental impacts to wetlands, floodplains and biological resources might be prevented or delayed), and the properties would be much easier to dispose of. As a whole, the plan minimizes adverse social impacts, provides positive environmental impacts at the location where they would be the greatest, causes no negative environmental impacts, and facilitates the disposal of the properties in the most efficient manner.

The overall lack of negative impacts associated with the proposed project, as documented in this EA, demonstrates both the benign nature and limited impacts of this project. The only identified negative impacts that would be seen during the implementation of this project are temporary construction-related impacts. The use of best management practices would take place in order to keep the potential impacts in the area to a minimum. Any negative impacts associated with the

construction of the proposed project, when added to other past, present and reasonable foreseeable future actions are collectively insignificant.

8.0 COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

8.1 Clean Water Act

As currently designed, implementation of Alternatives 3 and 4 as described in this EA, would require compliance of CFR 40 Part 230 Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material. The completed 404(b)(1) evaluation can be found in Appendix A of this document.

A National Pollutant Discharge Elimination System (NPDES) permit would be required for construction activities if over one acre of land would be disturbed. At this time, the total potential disturbed area for the construction of each alternative is undetermined. If the implementation of one of the proposed alternatives would require the disturbance of more than one acre of land, an NPDES permit would be required prior to construction.

In a letter dated March 13, 2014, the Kentucky Division of Water (DOW) acknowledged the proposed project and anticipates a §401 Water Quality Certification application from the USACE at a future date closer to construction. This certification is required for discharges of dredged or fill material within jurisdictional waters of the U.S. The letter can be found in Appendix I of the Main Report.

8.2 Clean Air Act

Ohio, Muhlenberg, Butler, Warren, and Edmonson Counties are considered attainment areas as defined in the Clean Air Act. Construction of any of the alternatives would only have a minor and temporary effect on air quality, and no additional work is required with regard to the Clean Air Act.

8.3 Endangered Species Act

In compliance with the Endangered Species Act, coordination has been undertaken with the USFWS and the Kentucky Department of Fish and Wildlife Resources (KDFWR) regarding endangered species and other sensitive species and natural areas with the project area. Through discussions with the USFWS, it was determined there is no need for the USACE to prepare a Biological Assessment (BA) regarding potential impacts to threatened and endangered species at this time. In a letter to USACE dated April 7, 2014, the USFWS explained that "(a) no adverse effects on federally listed species can be tied to the Corps' preliminary selection of preferred alternatives for each of the facilities, and (b) the specific project actions that would be implemented at each of the facilities and

resulting effects on federally listed species cannot be accurately determined based on the information currently available." Before implementation of the chosen alternative, the USACE would prepare a BA and make effects determinations for federally listed species in the action area, and subsequently continue consultation with the USFWS.

8.4 Farmland Protection Policy Act

The FPPA directs Federal agencies to identify and take into account the adverse effects of their programs on the preservation of farmlands. The implementation of any of the alternatives addressed in the EA would have no effect on farmlands associated with the project area.

8.5 Fish and Wildlife Coordination Act

In compliance with the Fish and Wildlife Coordination Act, coordination is continuing with the USFWS and the KDFWR regarding endangered species and other sensitive species and natural areas with the project area. Their comments have been noted and can been found in Appendix G of the Main Report. . A Fish and Wildlife Coordination Act Report for the Green and Barren Disposition Study was produced in 1999. However, due to its age, discussions with the USWFS have been reinitiated to ensure possible changes over the last 15 years are captured within this EA. See Section 8.3 for information on consultation with the USFWS.

8.6 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation Recovery Act (RCRA)

These two acts pertain to hazardous and toxic materials. The EPA's Envirofacts Facility Database was queried regarding the potential location of any CERCLA (Superfund) or RCRA sites in the vicinity of the proposed project areas. There are neither CERCLA nor EPA-regulated RCRA facilities located within one mile of the proposed project sites.

Site inspections were performed by contracted personnel from Geo Environmental Consultants, Inc. (G.E.C) personnel in 2000 and more recently by personnel from Environmental Resources Section of the Louisville District Corps of Engineers in 2013. Findings from the G.E.C site visits are detailed in the Environmental Baseline Study, Appendix E of the Main Report. These surveys have identified little or no potential for environmental contamination or disruption from past, present, or proposed activities.

8.7 Executive Order 11990 – Protection of Wetlands

Executive Order 11990 requires agencies to avoid, to the extent possible, long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. No long-term, adverse impacts are expected on wetlands under the proposed project. Section 4.9 of this EA describes any expected impacts to wetlands in the project area.

8.8 Executive Order 13653 - Preparing the United States for the Impacts of Climate Change

Executive Order 13653 requires agencies to undertake actions to enhance climate preparedness and resilience in order to prepare for the impacts of climate change. Implementation of the proposed alternative would promote a healthy, natural, and more robust river ecosystem that would be more apt to buffer organisms and their habitats from stressors within the environment caused by evolving climatic conditions. See Section 4.8 of this EA for a more detailed analysis of the expected benefitsto biological resources from implementation of the proposed alternative.

8.9 National Historic Preservation Act

In compliance with the National Historic Preservation Act, consultation has been undertaken with the Kentucky State Historic Preservation Officer (KY-SHPO) regarding historic properties (cultural resources listed, or eligible for listing, on the National Register of Historic Places [NRHP]). Through on-going consultation it has been determined the proposed project would have an adverse effect to the locks and dams (Appendix A – Main Report). Further consultation with the KY-SHPO and other interested parties would be undertaken to determine appropriate mitigation measures for inclusion in a Memorandum of Agreement to address project effects. Development of a Memorandum of Agreement would be completed prior to implementation of the chosen alternative.

9.0 Public Involvement and Coordination

Executive Order 12372, Intergovernmental Review of Federal Programs, states that Federal agencies shall provide opportunities for consultation by elected officials of those State and local governments that would provide the non-federal funds for or that would be directly affected by, proposed Federal financial assistance or direct Federal development. As required by NEPA (CEQ 1500.1), the

proposed project has been coordinated with Federal, State, and local government agencies having jurisdictional responsibilities, or otherwise having an interest in the project.

The proposed project and environmental assessment is currently being coordinated with the USFWS, KDFWR, KY-SHPO, and the Kentucky DOW. Their comments and recommendations will be considered in the final project plan and are provided in Appendices G and I, respectively, of the Main Report.

This EA was circulated for public review and comment from February 17, 2014 to March 17, 2014. It was sent to Federal, state and local agencies, public officials, and interested individuals for their comment. Received comments were considered in the decision to sign a Finding of No Significant Impact. All comments and USACE responses can be found in Appendix I of the Main Report.

10.0 REFERENCES

Cicerello, Ronald R. and Richard R. Hannon. 1990. *Survey of the Freshwater Unionids (Mussels) (Bivalvia: Margaritiferidae and Unionidae) in the Green River in Mammoth Cave National Park, Kentucky.* Kentucky State Nature Preserves Commission, Frankfort, Kentucky.

Cicerello, Ronald R. and Richard R. Hannon. 1991. *Survey and Review of the Fishes of Mammoth Cave National Park, Kentucky.* Kentucky State nature Preserves Commission, Frankfort, Kentucky.

Green and Barren Rivers Locks and Dams – Reconnaissance Disposition Study, Engineering (ED-TH) Appendix.

Green River Bioreserve Strategic Plan. 1998.

Kentucky Division of Air Quality Fiscal Year 2013 Annual Report. Commonwealth of Kentucky Energy and Environment Cabinet Department for Environmental Protection Division for Air Quality.

Luoma, Jeff. 1990. *Lock and Dam No. 6 on the Green River Compilation Paper and Annotated Bibliography, Mammoth Cave National Park, Kentucky.*

Natural Resources and Environmental Protection Cabinet (2004). "Kentucky Guidance for Ambient Background Assessment."

Stantec Consulting Services Inc. 2010. Updated Preliminary Findings Report Contract No. W912QR-08-D-0005 Task Order No. 0008 Green River Lock and Dam No. 3 Rochester, Kentucky

U.S. Army Corps of Engineers. 1993. *Water Resources Development in Kentucky, Louisville District.* U.S. Army Corps of Engineers, Louisville, Kentucky.

U.S. Army Corps of Engineers. 1990. *Interim Green and Barren Rivers Navigation Reconnaissance Study, Vol. 1.* Louisville District, U.S. Army Corps of Engineers, Louisville, Kentucky.

U.S. Army Corps of Engineers. 1979. *Green and Barren Rivers, Kentucky Environmental Assessment Studies.* Louisville District, U.S. Army Corps of Engineers, Louisville, Kentucky.

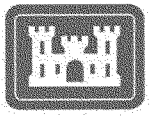
U.S. Army Engineer District. 1975. *Final Environmental Impact Statement, Continued Operation and Maintenance.* Green and Barren Rivers, Kentucky. U.S. Army Engineer District, Louisville, Kentucky.

U.S. Army Corps of Engineers, Louisville, District. 1990. *Green and Barren Rivers Kentucky and Tennessee Navigation Reconnaissance Report, Vol. 2.*

U.S. Census Bureau. (2014). *State & county Quickfacts: Butler, Edmonson, Muhlenberg, Ohio Counties,KY.* Retrieved January 15, 2014, from http://quickfacts.census.gov.

Widlak, James C. 1999. *Fish and Wildlife Coordination Act Report for the Green and Barren Rivers Disposition Study*. U.S. Fish and Wildlife Service, Ecological Services Field Office, Cookeville, Tennessee.

Appendix A



US Army Corps of Engineers
Louisville District

Clean Water Act Section 404(b)(1) Evaluation for the Disposition of Green River Lock and Dam Nos. 3, 4, 5, 6 and Barren River Lock and Dam No. 1

Prepared by:
U.S. Army Corps of Engineers, Louisville District
January 2014

I. Project Description

a. Location

The Green River Basin has a drainage area of 9230 square miles and stretches from west-central Kentucky into north-central Tennessee. Basin topography varies from gently rolling in the east to the moderately rugged Western Kentucky coalfields regions and then into a broad floodplain as the river enters the Ohio River just upstream of Henderson, Kentucky. Major tributaries include the Barren, Rough and Nolin rivers.

b. General Description

This Section 404(b)(1) evaluation addresses the discharge of dredged or fill material into the waters of the U.S. The U.S. Army Corps of Engineers (USACE) prepared a draft feasibility report and Environmental Assessment for the disposition of existing navigation facilities located on the Green and Barren Rivers between Brownsville, Kentucky and Rochester, Kentucky on the Green River, and at Greencastle, Kentucky on the Barren River. These facilities include Locks and Dams 3, 4, 5, and 6 on the Green River and Lock and Dam 1 on the Barren River. These facilities are the focus of this study because they are no longer used for navigation. This evaluation was used to make recommendations regarding the possible deauthorization and/or disposal of the facilities. Upon a favorable finding regarding deauthorization the facilities, the sites could then be disposed of using the provisions regarding surplus government property administered by the General Services Administration (GSA).

The recommended plan is to deauthorize all the projects and dispose of the properties after recommended construction is complete at each site. The recommended construction in Waters of the U.S. consists of demolishing the dam and filling the lock chamber at Green River Lock and Dam 6 and addressing stability at Green River Lock and Dam 3 by placing a concrete plug on the upstream side of the upstream miter gates.

c. Authority and Purpose

This study was authorized by Section 216 of the Flood Control Act of 1970 (P.L. 91-611), which is a general authority for the Secretary of the Army to review completed projects due to changed physical, economic or environmental conditions. This study was initially funded as part of a congressional add to the FY 1995 Energy and Water Resource Appropriation Bill

and the resulting study found that there would be insufficient benefits from commercial navigation operations to support restoration of navigation. Currently, the Corps of Engineers maintains the properties in a caretaker status.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material

The plug proposed for Lock No. 3 would be constructed of concrete and rebar. The fill material used in the filling of Lock No. 6 would be material from the demolished dam adjacent to the lock. This would consist of concrete, timber from the original timber cribs, and a limited amount of sediment from the dam structure.

A temporary road would be constructed within the channel of the Green River above Dam No. 6 so that heavy equipment can access the dam for demolition. This road would be constructed of commercial limestone riprap and aggregate.

(2) Quantity of Material

Construction of the concrete plug at Lock No.3 would require the removal of approximately 2,400 cubic yards of channel sediment in order to effectively prepare the work site. The plug would consist of rebar and 50 cubic yards of concrete.

The chamber of Lock No.6 would be filled with approximately 4,950 cubic yards of material from the demolished dam. The remaining 5,800 cubic yards of material from the demolished dam would be placed along the lower approach wall bringing the total fill to 10,750 cubic yards. These quantities include a swell and void factor of approximately 50 percent.

The temporary access road from landside (lock) to the mid-point of the dam would consist of 4,050 cubic yards of riprap. The access road from the mid-point to the far side of the dam would consist of an additional 3,700 cubic yards of riprap, for a total of 7,750 cubic yards to build the access road.

(3) Source of Material

The source of material in the channel of the river is sediments from the adjacent uplands. Sediments are primarily carried by runoff and smaller tributaries into the channel. Most of the adjacent lands upstream fall within the boundaries of Mammoth Cave National Park and are primarily in their natural state.

Material placed in and adjacent to Lock No. 6 would be directly from the concrete-capped timber crib dam and the commercial limestone riprap used in the temporary access road.

e. Description of the Proposed Discharge Sites

(1) Location

The concrete plug would be placed on the upstream side of the upstream miter gates of Lock No. 3.

Material from the demolished dam No. 6 would be placed in the adjacent lock and along the lower approach wall, not to extend past the lower end of the approach wall. Riprap hauled in to build the temporary access road to the dam would be removed and hauled off site.

(2) Size

The concrete plug would be comprised of 50 cubic yards of concrete and would be approximately 17 feet long (the width of the existing lock) x 2 feet wide x 36 feet high.

The temporary access road at Lock and Dam No.6 would be 20 feet in width at the surface and 66 feet at the river bed assuming a 23 feet height and 1:1 side slopes. From the land to the dam breaching area would be 110 feet and another 146 feet to reach to the far side of the dam.

(3) Type(s) of Sites and Habitats

The small footprint of the concrete plug proposed for placement at Lock No. 3 would have no significant adverse impact on aquatic habitat. In this area, the upstream miter gates slow water velocities and sediment falls around the base of the gates. The affected substrate is mostly unconsolidated sediments that offer no high quality habitat.

Placement areas at Lock and Dam No. 6 are similar to that of No. 3. The interior of the lock chamber is mostly unconsolidated sediments with sparse shrub vegetation that offers no valuable aquatic or terrestrial habitat. The placement area along the lower approach wall exhibits a mostly featureless substrate with no valuable or utilized habitat.

(4) Time and Duration of Discharge

Placement of the concrete plug at Lock and Dam No. 3 and filling of the No 6 chamber would take 2.3 years to complete. These discharges would be permanent. From its installation to its removal, the duration of the discharge

attributable to the access road would be 2.3 years, concurrent with the construction activities just mentioned.

f. Description of Disposal Method

The construction activities of the proposed plans would utilize the following vehicles:

(3) Hydraulic Excavators 4.5 CY Bucket

(2) 1000 FT-lbs Hydraulic Hammers

(1) 200 HP Dozer

(1) 100 Ton Track Crane

(1) Front End Loader 4 CY Bucket

(2) 25 Ton Off-Road Articulating Trucks

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate

The substrate of the proposed construction sites are mostly comprised of a thick layer of unconsolidated sediments that fall from the water column as water velocities are slowed by the dam.

(2) Sediment Type

Sediments at the project sites are mostly fine sediments and sands that have accumulated within the pools since the dams were constructed.

(3) Dredged/Fill Material Movement

Movement of fill material is not expected since most would be larger chucks of rock concrete and debris from Dam No. 6. The finer sediments are expected to be quickly redistributed into the river by natural water level fluctuations.

(4) Physical Effects on Benthos

Temporary and localized impacts to benthic organisms and their habitats would occur in the immediate areas of construction; however, benthic organisms are expected to

quickly rebound from the short-term impacts of material placement. Any impacts in the footprint of the permanent fills would be permanent.

(5) Other Effects

No other effects are known.

(6) Actions Taken to Minimize Impacts

Permanent impacts to the physical substrate from placement of fill material would be minimized by confining them to the Lock and chamber and the associated lower approach wall. The walls of the approach and the lock chamber would aid in piling the fill vertically, thus minimizing the footprint and impact to substrate.

The temporary access road would be promptly removed from the channel after demolition of the dam is complete.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

Increases in turbidity would occur at the construction areas and downstream of the areas during construction. Temporary changes in turbidity have not been modeled however they are not expected to significantly impact water quality.

No significant negative impacts would be expected to water quality or sensitive organisms where material would be placed.

(a) Salinity

There are no impacts expected to salinity.

(b) Water Chemistry

There are no impacts expected to water chemistry.

(c) Clarity

There may be a local and temporary increase in turbidity during construction activities. Water clarity is expected to return to normal background levels shortly after operations are completed

(d) Color

Water immediately surrounding the construction area may become discolored temporarily due to disturbance of the sediment.

(e) Odor

Negligible amounts of hydrogen sulfide may be expected when disturbing possible anoxic sediments at the construction sites. Otherwise, there are no long-term impacts to odor.

(f) Taste

There are no impacts expected to taste.

(g) Dissolved Gas Levels

A slight temporary decrease in dissolved oxygen levels in the immediate area of the construction may occur if anoxic sediments are disturbed. This would be temporary, and no other impacts to dissolved gas levels would be expected.

(h) Nutrients

There are no impacts expected to nutrients.

(i) Eutrophication

Construction activities would not lead to eutrophication of surrounding waters.

(j) Others as Appropriate

None known

(2) Current Patterns and Circulation

(a) Current Patterns and Flow

Construction activities would not have an effect on inflows to the system or water surface elevations.

(b) Velocity

Placement of material within the channel would not significantly impact velocities. Material at both sites would be placed within pool areas, where velocities are already very slow. The embankment constructed within the channel to remove Dam No. 6 would be removed immediately after demolition of the dam. Velocities in the stretch of river that is now Pool 6 would increase to naturally occurring velocities after removal is complete.

(c) Stratification

No change in this condition is expected.

(d) Hydrologic Regime

Hydrologic regimes would not be altered with placement of material.

(3) Normal Water Level Fluctuations

The average water surface elevation throughout the study area would be unaffected by construction activities.

(4) Salinity Gradients

There would be no change in salinity gradients.

(5) Actions That Would Be Taken to Minimize Impacts

The footprint of the placed material would be minimized to the greatest extent possible, such that impacts to water circulation, fluctuation, and salinity would be negligible.

c. Suspended Particulate/Turbidity Determination

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

A temporary and localized increase in suspended particulates and turbidity levels is expected during placement material at sites.

(2) Effects on Chemical and Physical Properties of the Water Column

(a) Light Penetration

Turbidity levels would be temporarily increased during placement operations material.

(b) Dissolved Oxygen

No adverse impacts to dissolved oxygen (DO) are expected; a reduction in DO may occur at localized and temporary events during placement.

(c) Toxic metals and organics

Suspended particles resulting from placement would not result in detrimental effects to chemical and physical properties of the water column.

(d) Pathogens

None expected or found.

(e) Aesthetics

No impacts to aesthetics are expected.

(f) Others as Appropriate

None known

(3) Effects on Biota

Localized impacts from placement operations are expected on photosynthesis, suspension/filter feeders, and sight feeders(e.g., burial of benthos or temporary increase of local turbidity levels). Most impacts are expected to be temporary; however, biota within the footprint of the permanent fill would be adversely affected.

(4) Actions Taken to Minimize Impacts

The footprint of the placed material would be minimized to the greatest extent possible, such that impacts to suspended particulates and turbidity levels would be negligible.

d. Contaminant Determinations

Fill material used in Lock No. 6 would be taken from the river directly adjacent to the lock. Previous investigations reveal no reason to believe that the considered fill material is a carrier of contaminants.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton

Construction and placement operations are expected to have only minor temporary, local impacts on plankton from increased turbidity levels.

(2) Effects on Benthos

Temporary and localized impacts to benthic organisms and their habitats would occur; however, benthic organisms are expected to quickly rebound from the short-term impacts.

(3) Effects on Nekton

No significant impacts to the nekton of the area from the proposed construction and placement operations are expected.

(4) Effects on Aquatic Food Web

Reductions in primary productivity from turbidity would be temporary and localized around the immediate area of the construction and would be limited to the duration of the plume at a given site.

(5) Effects on Special Aquatic Sites

Construction activities do not have detrimental effects on special aquatic sites in the study area (i.e., sanctuaries and refuges, wetlands, mudflats).

(6) Threatened and Endangered Species

Through consultation with the USFWS, it was determined there is no need for the USACE to prepare a Biological Assessment (BA) regarding potential impacts to threatened and endangered species at this time. In a letter to USACE dated April 7, 2014, the USFWS explained the reasoning for this determination which included that "(a) no adverse effects on federally listed species can be tied to the Corps' preliminary selection of preferred alternatives for each of the facilities, and (b) the specific project actions that would be implemented at each of the facilities and resulting effects on federally listed species cannot be accurately determined based on the information currently available." Before implementation of the chosen alternative, the USACE will prepare a BA and make effects determinations for federally listed species in the action area, while continuing subsequent consultation with the USFWS.

(7) Other Wildlife

No significant impacts to other wildlife species are anticipated.

(8) Actions to Minimize Impacts

Ongoing consultation with the USFWS will determine if the USACE will prepare a Biological Assessment (BA) regarding potential impacts to threatened and endangered species in the action area, and would apply measures to minimize impacts to these species.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

N/A

(2) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply

Construction activities would not impact any municipal or private water supplies.

(b) Recreational and Commercial Fisheries

No impacts to recreational and commercial fishing are anticipated as there are no expected impacts to the aquatic food web.

(c) Water-related Recreation

No impacts to water-related recreation would occur as a result of the proposed construction activities.

(d) Aesthetics

No impacts to aesthetics are expected.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

No special sites would be negatively impacted by the project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

The construction activities of the proposed project are expected to have negligible negative impacts to the environment. The removal of Green River Dam No. 6 would ultimately result in positive impacts to the aquatic ecosystem by restoring 17 miles of the Green River to a more natural flow regime and enhancing riverine habitat.

h. Determination of Secondary Effects on the Aquatic Ecosystem

No adverse significant secondary effects on the aquatic ecosystem should occur as a result of the proposed project.

III. Findings of Compliance with Restrictions on Discharge1. No significant adaptations of the guidelines were made relative to this evaluation.

2. The placement of the concrete plug within the lock at Lock and Dam No. 3 and the fill of the lock and Lock and Dam No. 6 are fully determined by the location of the locks. There are no practicable alternative discharge sites. Section 2.3 of the EA notes the possibility of using floating platforms and equipment as an alternative to construction of the embankment. The use of floating platforms and equipment has not been thoroughly evaluated for its potential to be less environmentally damaging than constructing the embankment because it has been determined not to be practicable due to exorbitant costs mostly due to logistic issues related to the rural location of the project sites. For these reasons, there is no practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem.

3. The discharges associated with the proposed project alternative are not anticipated to cause or contribute to violation of any water quality standards. A Clean Water Act Section 401 Water Quality Certification will be obtained from the State of Kentucky before commencing any work in waters of

the U.S. Analyses of recent sediment samples within the Green River indicate no unacceptable negative impacts can be expected to water quality or sensitive organisms during material placement.

4. Based on consultations with USFWS to date, the proposed discharge will not jeopardize the continued existence of any species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or result in destruction or adverse modification of any habitat determined by the Secretary of the Interior under that Act to be critical habitat. Before implementation of the proposed discharge, the USACE will prepare a BA and make effects determinations for federally listed species in the action area, while continuing consultation with the USFWS.

5. Given the factual determinations made in Part II of this evaluation, the proposed discharge will not cause or contribute to significant degradation of waters of the United States.

6. All appropriate and practicable steps have been taken to minimize any potential adverse effects on the aquatic ecosystem.



US Army Corps of Engineers
Louisville District

Finding of No Significant Impact

Disposition of Green River Locks and Dams Nos. 3, 4, 5, 6 and Barren River Lock and Dam No. 1

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1. The U.S. Army Corps of Engineers has proposed a project for the deauthorization of Green River Locks and Dams Nos. 3, 4, 5, 6 and Barren River Lock and Dam No. 1. The Green and Barren Rivers Locks and Dams Disposition Feasibility Study ("Study") was authorized by Section 216 of the Flood Control Act of 1970 (P.L. 91-611), which is a general authority for the Secretary of the Army to review completed projects due to changed physical, economic or environmental conditions. These locks and dams were originally authorized for the purpose of navigation but are now obsolete as no navigation occurs upriver of them. At the time this Study was originally made available for public review, the Corps recommended seeking Congressional deauthorization of the projects' purpose, modification of several of the facilities, and ultimately disposition of the facilities. The Study was subsequently changed to recommend only deauthorization, with minor modification of and, ultimately, disposal of the facilities to be undertaken outside the purview of the Study's recommendations.

2. In accordance with ER 200-2-2, *Policy and Procedures for Implementing the National Environmental Policy Act* (NEPA), an EA was prepared and circulated contemporaneously with the unsigned, draft Finding of No Significant Impact and the Study for a 30-day public and agency review. Coordination with the Kentucky State Historic Preservation Officer (SHPO) and federally recognized tribes was conducted. Alternatives considered in the environmental assessment (EA) were: No Action, disposal after installation of warning signs and barricades to impede access to river side lock wall, disposal after dam removal and stabilization of locks, and disposal after modifying locks. Congressional deauthorization of the navigation purpose of the obsolete locks and dams is a prerequisite to all of the action-based alternatives. An effort was made to address all environmentally related public and agency comments, as appropriate, in the EA. The Corps' further responses to comments are found in Appendix I of the main Study. After assessing all comments and agency policy considerations, the Corps shifted its preference between the alternatives whose impacts were examined in the EA to arrive at the preference stated herein.

3. In this final Finding of No Significant Impact, the Corps identifies deauthorization after installation of barricades and signs (identified as Alternative 2 in the EA) as its preferred alternative for Green River Locks and Dams Nos. 3, 4, 5 and 6 and Barren River Lock and

Dam No. 1. The Corps plans to implement elements (installation of barriers and signs) of this preferred alternative under its existing authorities using available Operations and Maintenance Funds, and will not include them as recommendations to Congress.

4. The EA revealed minimal or no adverse impacts upon water quality, aquatic resources, terrestrial resources, air quality, land use, infrastructure or noise from the actions constituting the preferred alternative as identified herein. There would be no significant impacts from the proposed actions on wetlands. No significant issues were noted regarding hazardous, toxic, or radioactive materials. Installation of signs and barricades is expected to yield public safety benefits. The EA revealed no effects on the human environment from the actions constituting the preferred alternative that would, when added to other past, present and reasonably foreseeable future effects, be significant. The preferred alternative is in compliance with the Clean Air Act and Executive Order 12898 for Environmental Justice. The preferred alternative would not disproportionately place any adverse environmental, economic, social, or health impacts on minority or low-income populations.

5. The preferred alternative does not involve placement of fill material into waters of the U.S. and is not subject to Sections 401 and 404 of the Clean Water Act (CWA).

6. Coordination with U.S. Fish and Wildlife Service (USFWS) and Kentucky Department of Fish and Wildlife Resources (KDFWR), per the Fish and Wildlife Coordination Act (FWCA 48 Stat, 401, as amended; 16 U.S.C. .661 et seq.) and Endangered Species Act, was initiated by scoping letter. USFWS's comments are found in Appendix I of the main Study. In a letter to USACE dated July 18, 2014, the USFWS concurred that the Corps' preferred alternative as identified herein would have no effect on threatened or endangered species.

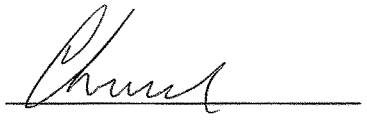
7. Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, and its implementing regulations at 36 CFR 800 require consideration of cultural resources prior to a federal undertaking and require consultation with the KY-SHPO, federally recognized tribes with a connection to the project location, and other consulting parties defined at Section 800.3. The NHPA only affords protection to sites, buildings, structures, objects, or landscapes listed in or determined eligible for listing in the National Register of Historic Places (NRHP). An archaeological survey report and a summary of the history and architecture have been completed for the Green River Locks 3-6 and Barren River Lock 1. Through Section 106 coordination, the Kentucky State Historic Preservation Officer (KY-SHPO) concurs with the NRHP eligibility of the locks and dams and concurs that if the federal government disposes of the properties, transfer from federal ownership would result in an adverse effect to these historic properties. The KY-SHPO recommended that as Section 106 consultation moves forward, the parties consider updated photographs of land based structures at the facilities and ways to preserve the integrity of the facilities. Based on consultation with the KY-SHPO, the Corps will develop and execute a Memorandum

of Agreement (MOA) or a Programmatic Agreement prior to the commencement of any transfer of the property from federal ownership or associated construction activities.

8. The actions associated with the preferred alternative for the five lock and dams are deauthorization of project purpose, installation of signs and barricades, and eventual disposal. Deauthorization is merely a change in legal status involving no change to existing operations and therefore no effects on the human environment. The final Study recommends Congressional deauthorization of all five locks and dams. Because the final Study will not contain any recommendation for authorization or funding of construction, it is therefore exempt from NEPA review under the categorical exclusion codified at 33 C.F.R. 230.9(d).

9. Installation of warning signs and barricades at these completed Corps projects as contemplated in the EA are ordinary operations, maintenance or custodial activities to carry out the authorized project purposes and are therefore exempt from NEPA review under the categorical exclusion codified at 33 C.F.R. 230.9(b). Should Congress deauthorize the locks' and dams' project purpose as recommended in the report, disposal of the properties will be a natural and foreseeable future step. The Corps action of reporting real properties to the General Services Administration (GSA) for disposal would be exempt from NEPA review under the categorical exclusion codified at 33 C.F.R. 230.9(m). At this point, given the potential for direction by Congress, the role of GSA and the array of potential recipients of the properties, the effects of disposal itself are too speculative to all be fully considered in this NEPA document and a finding as to their significance would not be timely. However, NEPA review should be considered with regard to the disposal at the appropriate time and by the appropriate agency.

10. All practicable means to avoid and minimize adverse environmental effects have been incorporated into the preferred alternative. No compensatory mitigation is required. I have reviewed the disposition proposal, the public and agency comments, the categorical exclusions mentioned and the EA in light of the general public interest. I have determined that allowing the project to proceed would not constitute a major federal action significantly affecting the quality of the human environment within the meaning of the NEPA of 1969, as amended. Accordingly, I have concluded that preparation of an Environmental Impact Statement would not be required.



29 JUNE 2016

Christopher G. Beck
Colonel, Corps of Engineers
Commanding

Date

Appendix E:
Environmental Baseline Survey

ENVIRONMENTAL BASELINE STUDY (EBS) DISPOSAL OF GREEN RIVER LOCK AND DAM NOS. 3, 4, 5, AND 6, AND BARREN RIVER LOCK AND DAM NO. 1, KENTUCKY

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers, Louisville District, is considering the disposal of federal interest in Green River Locks and Dams nos. 3, 4, 5, and 6, and Barren River Lock and Dam No. 1 due to the lack of any continued authorized project purpose.

In February 2000, G.E.C., Inc. was contracted to conduct an Environmental Baseline Study (EBS) in order to facilitate the possible disposals. In accordance with applicable requirements of Army Regulation 200-1, *Environmental Protection and Enhancement*, and American Society for Testing and Materials Standard E1527-97, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment*, and U.S. Army Corps of Engineers Regulation ER 1165-2-132, *Water Resources Policies and Authorities for Hazardous, Toxic, and Radioactive Waste for Civil Works Projects*, 26 June 1992 G.E.C. reviewed Department of the Army records, federal, state, and local databases and federal and state agency evaluations, conducted historical research of the sites and surrounding areas, interviewed pertinent personnel, and performed site investigations in order to characterize environmental conditions at each site. Recent site investigations by USACE, Louisville District personnel were conducted on December 2-3, 2013 to evaluate any changes that may have occurred at the sites since the EBS conducted by G.E.C was prepared. No substantive changes have occurred at any of the sites since this EBS was completed, therefore, new database and records checks were not deemed necessary.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at any of the sites.

Hydraulic oil released to the environment at Green River Lock and Dam No. 5 and Barren River Lock and Dan No. 1 has the potential to contain polychlorinated biphenyls, as does a pole-mounted transformer located at Green River Lock and Dam No. 6. If either of locks and dams nos. 1 and 5 are removed, analytical investigations of soils under the structures could be warranted. The transformer at Lock and Dam No. 6 appears to pose no current hazard to human health or the environment, however if its removal is required pursuant to any disposal action it should be done so in accordance with state and local regulations.

G.E.C. could find no information in the course of the records review or field investigations that any of the facilities ever stored significant amounts of petroleum products and/or petroleum

derivatives, or that a release of such materials ever occurred, except at Barren River Lock and Dam No. 1 and Green River Lock and Dam No. 5, where hydraulic oil stains were observed in the operations buildings and at several locations in the lock chambers. The stains are the result of vandalism to hydraulic piping systems at both sites, and hydraulic oil has been released to the environment.

Chipped, cracked, and flaked paint was observed at each site, on fittings associated with the locks and on various other structures. Should the paint contain lead, conditions at all five sites could pose a hazard to human health, and removal or disturbance of any of the structures would have to be conducted in accordance with state and local regulations.

There appear to be no asbestos concerns at any of the properties except Green River Lock and Dam No. 3, where possible asbestos containing material, in the form of ceiling tiles, was observed in the former residence. Should the tiles contain asbestos, conditions in the residence could pose a hazard to human health. Disturbance or removal of the residence would have to be conducted in accordance with state and local regulations.

There are no apparent air quality issues associated with any of the properties other than the possible lead and asbestos concerns.

None of the five sites is secured from public access, and significant falling/drowning hazards are present at all of the sites. For these reasons, there is liability associated with continued ownership of the projects.

No potential environmental sites of concern appear to be located within the recommended search radius for any of the five sites.

Except for the remaining federal property at Green River Lock and Dam No. 4 (0.01 acre), forested palustrian wetland occurs at each site.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of any of the sites and efforts are currently underway to document existing structures at each facility and coordinate the results of these studies with the Kentucky Heritage Council. To date, the Louisville District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photograph documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. It is expected that these facilities will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

Threatened and endangered species are known to occur in the vicinity of each project.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, Green River Locks and Dams Nos. 3, 4, and 6 are Category 1 sites, those where no release or disposal of hazardous substances or petroleum products has occurred, and no migration of these substances from adjacent areas has occurred. Barren River Lock and Dam No. 1 and Green River Lock and Dam No. 5 are Category 2 sites, those where only release or disposal of petroleum products has occurred.

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1.0 PURPOSE OF THE ENVIRONMENTAL BASELINE STUDY

The purpose of this Environmental Baseline Study (EBS) is to characterize the environmental baseline conditions of Green River Locks and Dams Nos. 3, 4, 5, and 6, and Barren River Lock and Dam No. 1, Kentucky, and identify any potential environmental impacts posed by the transfer of the facilities from U.S. Army Corps of Engineers (Corps) ownership.

1.1 Introduction

The Corps, Louisville District (District) is considering the disposal of federal interest in Green River Locks and Dams Nos. 3, 4, 5, and 6, and Barren River Lock and Dam No. 1 due to the lack of any continued authorized project purpose.

Four alternatives are under consideration. The first is one of no action, i.e. the facilities, along with any adjacent Corps-owned property, would remain in federal ownership and no operations or maintenance would be conducted at the sites. The second is disposal of the sites in their existing condition. A third alternative involves disposal of the sites after stabilizing their improvements, and the fourth alternative is disposal of the sites after removal of the improvements.

1.2 Scope of Work

The objectives of this EBS are:

1. To characterize the environmental baseline conditions of the properties and identify any potential environmental contamination liabilities associated with their transfer from Corps ownership;

2. To evaluate all existing environmental information related to storage, release, treatment, or disposal of hazardous substances or petroleum products at the properties in order to determine or discover the presence, or likely presence, of a release, or threatened release, of any hazardous substance or petroleum product;

3. To briefly identify all, if any, natural, cultural, and historical resources of concern related to the possible property transfers; and

4. To determine the condition of the properties in accordance with *Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access*, as specified by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 120(h), and current Department of Defense (DOD) guidance;

To achieve these objectives, G.E.C., Inc. (G.E.C.) was directed to rely on existing documents, data, interviews, and inspections of the properties. In general, additional studies or analyses were not anticipated as necessary to prepare the EBS. The complete Scope of Work for this project is presented in Appendix A.

2.0 METHODOLOGY

This report was prepared in accordance with the applicable requirements contained in the following documents:

Army Regulation 200-1 (AR 200-1), *Environmental Protection and Enhancement*, 21 February 1997;

U.S. Army Corps of Engineers Regulation ER 1165-2-132, *Water Resources Policies and Authorities for Hazardous, Toxic, and Radioactive Waste for Civil Works Projects*, 26 June 1992; and

American Society for Testing and Materials Standard (ASTM) E1527-97, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.*

2.1 Department of the Army Records

In accordance with AR 200-1, G.E.C. personnel conducted a detailed search and review of records and information at the District on January 24, 2000, and all real estate and environmental files provided by the District were reviewed. Refer to Appendix B for a list of the references consulted in the preparation of this study.

2.2 Federal, State, and Local Records

Vista Information Solutions, Inc. (Vista) conducted an environmental database search for each project area. Particular attention was given as to whether National Priority List (NPL) sites or permitted treatment, storage, and disposal (TSD) sites of hazardous waste and material are located within one mile of the properties.

G.E.C. also collected supplemental environmental data directly in order to ensure adequate regulatory record review for the project areas. Between Vista's database search and G.E.C.'s supplemental data review, all applicable and reasonably obtainable federal, state, and local government environmental records specified by AR 200-1 and ASTM E1527-97 were reviewed for each property and adjacent properties. The areas fall under the jurisdiction of the Kentucky Department for Environmental Protection (KDEP) and Region IV, U.S. Environmental Protection Agency (EPA).

2.3 Interviews

District and other pertinent personnel were interviewed pursuant to this investigation regarding site history and current conditions, and whether environmental concerns are present. Points of contact are presented in Appendix C.

2.4 Site Investigations

Site investigations were conducted in order to inspect the properties, including any buildings, structures, equipment, pipes, pipelines, or other improvements on, or adjacent to, each site, and to note utility lines, runoff patterns, evidence of environmental impacts or other observations that might indicate any actual or potential releases of hazardous substances or petroleum products. G.E.C. personnel conducted thorough inspections at the properties January 24-26, 2000. EBS checklists were completed during each inspection, they are presented sections B1 and G3-G6, Appendix B. Photographs taken during the investigations are presented in sections B1 and G3-G6, Appendix C.

2.5 Historical Use Information

Prior to performing the field investigations, a thorough historical record review was conducted for each site. The objective in consulting historical sources is to develop an idea of the previous uses and occupants of a site and the surrounding area. For this project G.E.C. reviewed topographic maps, land title records, and historical aerial photographs. All real estate and environmental files made available by the District were also reviewed. Appendix B contains a complete list of the references consulted.

U.S. Geological Survey (USGS) Topographic (quadrangle) maps were reviewed to identify structures, mines/quarries, clearings, wells, or other indications of potential areas of concern. Land title records dating to the 19th century were reviewed in order to view fee ownership, leases, land contracts, easements, liens, and other encumbrances for each site.

2.6 Federal and State Agency Evaluations

G.E.C. researched evaluations prepared by the U.S. Department of the Interior regarding wetland status and threatened/endangered species and their habitats for each site.

The District provided Information as to whether the sites, or nearby properties, qualified as significant cultural or archaeological resources.

2.7 Limitations and Exceptions

G.E.C.'s review included record information that was reasonably ascertainable from standard sources. *Reasonably ascertainable* implies: (1) information that is publicly available; and (2) information that is obtainable from its source within reasonable time and cost constraints. G.E.C.'s review included information gathered directly from regulatory agencies and an electronic database search performed by Vista.

The results and conclusions of this report are limited to the portions of the project areas that were actually observed and the records that were reviewed. No guarantee is made or intended that all

site conditions were observed or that all records were reviewed. Should any higher level of confidence be required, physical sampling and laboratory analyses would be necessary.

Much of the information provided in the report was compiled from public records and other sources maintained by third parties. Although reasonable care was exercised in its preparation, G.E.C. cannot be held responsible for errors, omissions, or inaccurate information.

3.0 PROJECT SETTING

3.1 Project Data and Locations

Project data and locations are presented in Figure1.

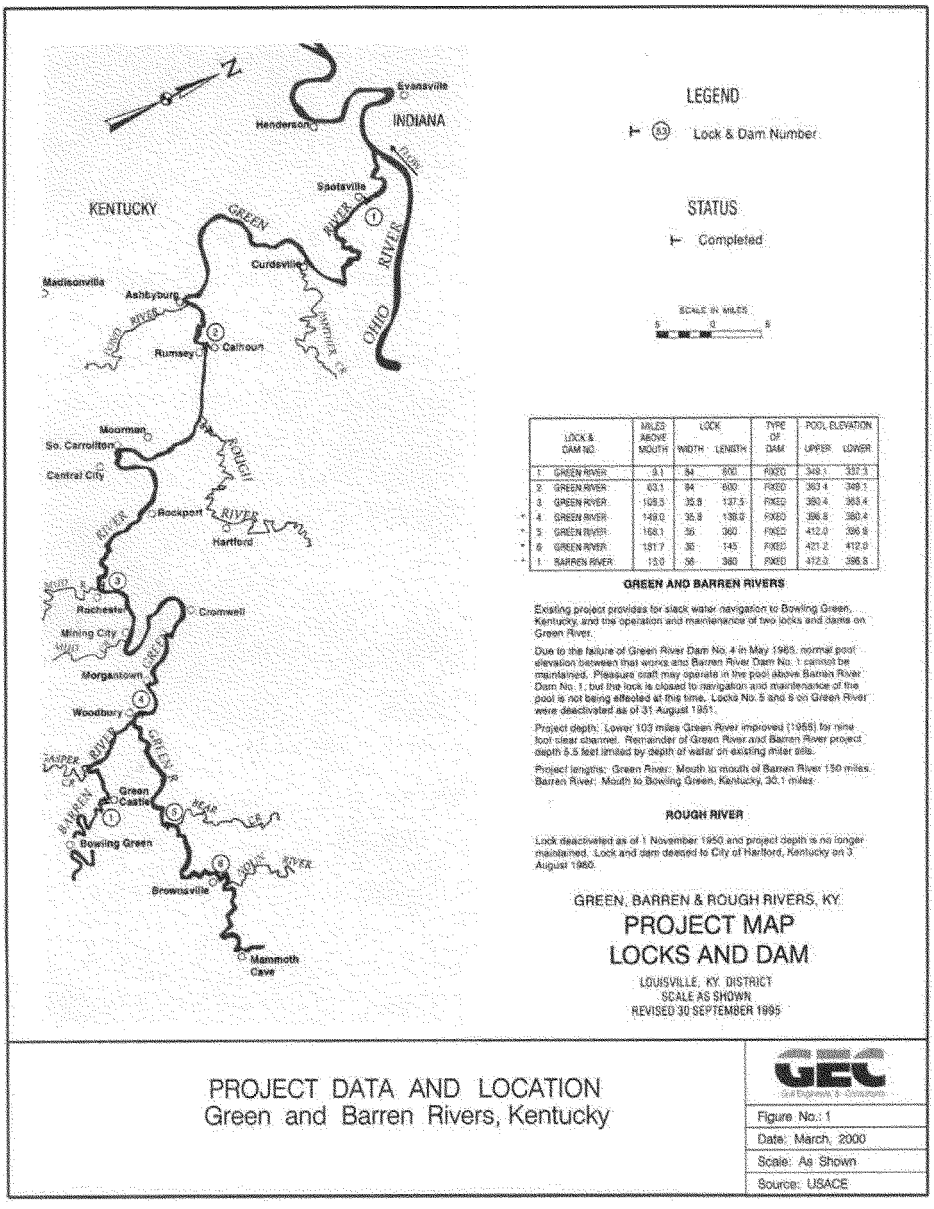
Barren River Lock and Dam No. 1 (B1) is located just upstream of Greencastle, in Warren County, Kentucky, 15 miles above the mouth of the Barren River. The site occupies approximately 16.63 acres on the right descending bank, and improvements at the site include the lock, dam, esplanade, and operations building. The original lock and dam were built in 1841 and acquired by the United States on February 20, 1886. The current lock and dam were built 1933-1934 and operations commenced on September 17, 1934. Operations ceased May 24, 1965 due to the breach at Green River Lock and Dam No. 4 and a subsequent loss of pool.

Green River Lock and Dam No. 3 (G3) is located just downstream of Rochester, in Muhlenberg and Ohio counties, Kentucky, 108.5 miles above the mouth of the Green River. The site occupies approximately 4.99 acres on the left descending bank and 6.72 acres on the right descending bank. Improvements at the site include the lock and dam and the remains of a residence, warehouse, garage, well, and septic tank, all on the right descending bank. The original lock was built in 1833-1836 and acquired by the United States on February 4, 1895. Locking operations were discontinued in September 1981.

Green River Lock and Dam No. 4 (G4) is located at Woodbury, Butler County, Kentucky, 149.0 miles above the mouth of the Green River. Government-owned property at the site consists of the lock and lock walls and a U.S. Geological Survey (USGS) gauging station situated on a 0.01-acre tract located on the left descending bank.

Green River Lock and Dam No. 5 (G5) is located near Glenmore, in Butler and Warren counties, Kentucky, 168.1 miles above the mouth of the Green River. The site occupies approximately 27.064 acres on the right descending bank and 5.21 acres on the left descending bank.

Figure 1. Project Data and Location



Improvements at the site include the lock, dam, the remains of an earlier lock, an operations building, and a spring house, all on the right descending bank. The original lock was put into operation on January 17, 1900 and taken out of service in 1934. The current lock and dam were built in 1933-1934 and operations commenced on December 22, 1934. The structure was deactivated on August 31, 1951.

Green River Lock and Dam No. 6 (G6) is located just upstream of Brownsville, in Edmonson County, Kentucky, 181.7 miles above the mouth of the Green River. The site occupies approximately 18.0 acres on the right descending bank and 0.83 acres on the left descending bank. Improvements at the site include the lock, dam, a spring house located on the 0.83-acre tract, and a U.S. Geological Survey (USGS) gauging station located on the 18.0-acre tract, upstream of the lock. Operations commenced on January 1, 1906 and ceased on August 1, 1951. The structure was deactivated on August 31, 1951.

3.2 History

The Commonwealth of Kentucky authorized and funded a slackwater navigation project on the Green and Barren rivers from the Ohio River to Bowling Green, Kentucky. Construction of the 175-mile project was completed in 1842 and consisted of G1-G4, and B1. The dams consisted of stone-filled, timber cribs varying from 300 to 680 feet in length and from 15 to 22 feet in height. Lock chamber dimensions were 36 feet by 160 feet. The project provided for a 5.5-foot channel and average lift of the stone-masonry locks was 15.5 feet.

The structures were damaged for military reasons during the Civil War and their maintenance was neglected. Rather than legislate funds for their repair, the Commonwealth leased the locks and dams to the Green and Barren River Navigation Company in 1868 with the provision that the company repair and maintain the system. The arrangement lasted until the early 1880s.

The company offered to sell the project in 1884, and the Commonwealth of Kentucky ceded its rights of eminent domain to the United States in 1886. Under the River and Harbor Act of 1888, the United States appropriated money to purchase the project and initiated repair and reconstruction of the locks and dams.

In order to extend the system upstream and to open mineral resources along Bear Creek and Nolin River, the United States authorized construction of G5 under the River and Harbor Act of July 13, 1892. G6 was authorized under the River and Harbor Act of July 13, 1902.

G5 and G6 were closed due to a lack of traffic in 1951. G4 was breached on May 24, 1965 and has not been restored. The breach at G4 and resulting loss of pool prevented barge traffic from reaching B1, and it was subsequently deactivated.

3.3 Geography

The Green River Basin is located in west-central Kentucky and north-central Tennessee. It encompasses all or parts of 31 counties in Kentucky and three in Tennessee. The basin comprises an area of 9,273 square miles.

The Green River originates in Lincoln and Casey counties in Kentucky and flows 330 miles in a northwesterly direction to its confluence with the Ohio River, eight miles upstream of Evansville, Indiana. The river varies in width from a few feet in upstream areas to approximately 1/3 mile in downstream areas. Elevations range from 1,800 feet above sea level near the source to 337 feet at the mouth. Among the principal tributaries of the Green River are the Barren, Nolin, Pond, and Rough rivers. The population in the basin is predominately rural.

3.4 Physiography

The project area, as well as the entire Green River Basin, lies within the Interior Low Plateau Physiographic Province. This province is south of the limit of glaciation and along the axis of the Cincinnati Arch. The topography of the Green River Basin varies from rugged hilly terrain in the eastern part of the basin, deep valleys and cavern areas in the central section, to swampy and wide alluvial plains in the western and northern sections.

Two major physiographic regions occur within the project area: the Western Coal Fields Region, which is located in the western portion, comprises most of the project area. This area is characterized by gently rolling uplands and broad floodplains up to three miles wide.

The Mississippian Plateau, also known as the Pennyroyal Region, covers most of the central and eastern portions of the basin, and the southern portion of the project area. The area is characterized by undulating limestone uplands and moderately wide floodplains. Numerous karst areas and large caverns formed by subsurface drainage occur in this region.

3.5 Climate

The climate of the project area is of the humid, subtropical type. The mean annual temperature is about 57° Fahrenheit, varying from a mean of 37° Fahrenheit in January to a mean of 76° Fahrenheit in July. The area has a growing season of approximately 180 days.

Precipitation in the project area is fairly evenly distributed throughout the year, with smaller amounts occurring in late summer and fall. The average annual rainfall over the entire Green River Basin averages 47 inches, varying from 42 inches in the lower portion of the basin to 49 inches in the upper portion.

3.6 Soils

Soils in the project area are divided into three major categories based on the material in which they were developed. Some soils in the uplands and along valley walls were developed from residuum, a weathered form of bedrock. Other soils in the uplands were developed from loess. The soils in the bottomland along the stream valleys were developed in the alluvium. The three dominant soil associations in the lower Green River Basin include the Gilpin-Wellston Association, the Gilpin-Caseyville-Dekalb Association, and the Baxter-Bedford Association.

3.7 Geology

The Green River Basin overlaps two major structural features, the Illinois Basin and the Cincinnati Arch. The Western Coal Fields Region forms the extreme southern part of the larger Illinois Basin. The rocks in this area are Pennsylvanian in age, and, with the exception of the Quaternary alluvium near the Ohio River, are the youngest formations in the basin.

The Cincinnati Arch, a northeast-southwest trending anticline, is located east of the Western Coal Fields Region. Rocks in this area get progressively older from west to east, moving up the western flank of the Arch.

An east-west trending system of complex faults extends across the Green River Basin. This system, known as the Rough Creek Fault Zone, is thought to be part of a 400-mile long structural disturbance extending from central Pennsylvania, across West Virginia and Kentucky, into southern Illinois. The principal fault in the system is probably a high-angle thrust fault, with the south side being the up-thrown block. A number of oil pools that are associated with the Rough Creek system have been developed in the basin.

The oldest rocks at the bedrock surface in the Green River Basin are of Ordovician age. These rocks are located in the extreme eastern portion of the basin and consist of interbedded limestones and shales. Moving to the west, the bedrock becomes progressively younger. A series of Silurian and Devonian limestones and shales immediately overlie the Ordovician formations.

The Mississippian and Pennsylvanian systems comprise over two-thirds of the bedrock surface in the basin. Rocks of the Osage Group are at the base of the Mississippian section in this area and consist of shale, limestone, chert, and sandstone. The next youngest group of rocks within the Mississippian system are the limestones of the Meramec Group, which are cavernous and underlie the rolling karst areas in the basin. Most of the caverns of Mammoth Cave are developed in one of these formations. At the top of the Mississippian section are the sandstones, limestones, and shales of the Chester Group.

Rocks of the Pennsylvanian System occur in the Western Coal Fields Region. Conglomerates, sandstones, siltstones, and shale are included in this sequence, as well as some coal and thin limestone. Among the coal-bearing formations are the Caseyville Sandstone, the Tradewater Formation, and the Carbondale Formation.

The top of the stratigraphic sequence in the Green River Basin is comprised of Quaternary alluvium, which consists of sand, gravel, silt, and clay that was deposited along the Ohio River as glacial outwash.

4.0 SIGNIFICANT FINDINGS

4.1 Polychlorinated Biphenyls

Hydraulic oil released to the environment at Green River Lock and Dam No. 5 and Barren River Lock and Dam No. 1 has the potential to contain polychlorinated biphenyls, as does a pole-mounted transformer located at Green River Lock and Dam No. 6. If either of locks and dams nos. 1 and 5 are removed, analythical investigations of soils under the structures could be warranted. The transformer at Lock and Dam No. 6 appears to pose no current hazard to human health or the environment, however if its removal is required pursuant to any disposal action it should be done so in accordance with state and local regulations.

4.2 Petroleum Products / Petroleum Derivatives

G.E.C. observed hydraulic oil stains in the operations buildings and at several locations in the lock chambers at B1 and G5. The stains are the result of vandalism to the hydraulic piping system, and hydraulic oil has been released to the environment. However, it is G.E.C.'s opinion that any hazard to human health or the environment posed by the releases is low.

4.3 Lead

Chipped, cracked, and flaked paint was observed at each site, on fittings associated with the locks and on various other structures. Should the paint contain lead, conditions at all five sites could pose a hazard to human health, and removal or disturbance of any of the structures would have to be conducted in accordance with state and local regulations.

4.4 Asbestos

There appear to be no asbestos concerns at any of the properties except Green River Lock and Dam No. 3, where possible asbestos containing material, in the form of ceiling tiles, was observed in the former residence. Should the titles contain asbestos, conditions in the residence could pose a hazard to human health. Disturbance or removal of the residence would have to be conducted in accordance with state and local regulations.

4.5 Public Safety

None of the five sites is secured from public access, and significant falling/drowning hazards are present at all of the sites. For these reasons, there is liability associated with continued ownership of the projects.

4.6 Wetlands

Except for the remaining federal property at G4, forested palustrian wetland occurs at each site, in the form of narrow riparian zones adjacent to the river.

4.7 Cultural Resources

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of any of the sites and efforts are currently underway to document existing structures at each facility and coordinate the results of these studies with the Kentucky Heritage Council. To date, the Louisville District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. It is expected that these facilities will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

4.8 Threatened and Endangered Species

Threatened and endangered species occur in the Green and Barren rivers and on adjacent terrestrial habitat. The federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system, portions of which are located within the pool created by G6, and the U.S. Fish and Wildlife Service (USFWS) has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the species.

Caves in the study area also provide habitat for the federally endangered gray bat and Indiana bat, which use the caves as hibernacula. One cave within the study area is known to support a gray bat maternity colony, and future surveys in additional caves may find other maternity colonies. Suitable habitat for Indiana bat maternity colonies also exists throughout the project area, and additional studies may confirm their presence.

The study project area also contains habitat for a variety of federally listed species of birds. Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range. The

Federally endangered American peregrine falcon (*Falco peregrinus anatum*) also occurs as a migrant or transient in the study area.

Endangered freshwater mussels in the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket pearly mussel (*Lampsilis abrupta*), and the fanshell (*Cyprogenia stegaria*). Recently deceased specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have also been observed, indicating their presence in the project area as well. Other listed mussel species that might still occur in the project area include the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Edpioblasma sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussels still reproduce in the Green River, and it is thought that this is one of the few, perhaps the only, rivers in which this occurs.

Federally threatened plants found in the study area include Price's potato bean (*Apios priceana*) and Eggert's sunflower (*Helianthus eggertii*).

Rare species for which potential habitat exists in the project area include the southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*Myotis leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*), eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender, Kirtland's water snake (*Clonophis kirtlandi*), cooperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), spectacle case pearly mussel (*Cumberlandia monodonta*), Kentucky creekshell mussel (*Villosa ortmanni*), rabbit's foot pearly mussel (*Quadrula cylindrica*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). These species are not currently considered candidate species, however, they could be listed in the future if their numbers decline and threats to their survival persist.

5.0 SUMMARY AND CONCLUSIONS

The Corps is considering the disposal of federal interest in B1, G3, G4, G5, and G6 due to the lack of any continued authorized project purpose, and G.E.C. was contracted by the District to conduct an EBS in order to facilitate the disposals. In accordance with applicable requirements of AR 200-1 and ASTM E1527-97, G.E.C. reviewed Department of the Army records and federal, state, and local databases, federal and state agency evaluations, conducted historical research of the sites

and surrounding areas, interviewed pertinent personnel, and performed site investigations in order to characterize environmental conditions at each site.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at any of the sites.

Hydraulic oil released to the environment at Green River Lock and Dam No. 5 and at Barren River Lock and Dam No. 1 has the potential to contain polychlorinated biphenyls, as does a pole-mounted transformer located at Green River Lock and Dam No. 6. If either of locks and dams nos. 1 and 5 are removed, analythical investigations of soils under the structures could be warranted. The transformer at Lock and Dam No. 6 appears to pose no current hazard to human health or the environment, however if its removal is required pursuant to any disposal action it should be done so in accordance with state and local regulations.

G.E.C. could find no information in the course of the records review or field investigations that any of the facilities ever stored significant amounts of petroleum products and/or petroleum derivatives or that a release of such materials ever occurred, except at B1 and G5, where hydraulic oil stains were observed in the operations buildings and at several locations in the lock chambers. The stains are the result of vandalism to hydraulic piping systems at both sites, and hydraulic oil has been released to the environment. However, it is unlikely that the releases pose any hazard to human health or the environment.

Chipped, cracked, and flaked paint was observed at each site, on fittings associated with the locks and on various remaining structures. Should the paint contain lead, conditions at all five sites could pose a hazard to human health, and removal or disturbance of any of the structures would have to be conducted in accordance with state and local regulations.

There appear to be no asbestos concerns at any of the properties except Green River Lock and Dam No. 3, where possible asbestos containing material, in the form of ceiling tiles, was observed in the former residence. Should the tiles contain asbestos, conditions in the residence could pose a hazard to human health. Disturbance or removal of the residence would have to be conducted in accordance with state and local regulations.

There are no apparent air quality issues associated with any of the properties other than the possible lead and asbestos concerns.

None of the five sites is secured from public access, and significant falling/drowning hazards are present at all of the sites. For these reasons, there is liability associated with continued ownership of the projects.

No potential environmental sites of concern appear to be located within the recommended search radius for any of the five sites.

Except for the remaining federal property at G4, forested palustrian wetland occurs at each site.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of any of the sites and efforts are currently underway to document existing structures at each facility and coordinate the results of these studies with the Kentucky Heritage Council. To date, the Louisville District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. It is expected that these facilities will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

Threatened and endangered species are known to occur in the vicinity of each project.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, G3, G4, and G6 are Category 1 sites, those where no release or disposal of hazardous substances or petroleum products has occurred, and no migration of these substances from adjacent areas has occurred. B1 and G5 are Category 2 sites, those where only release or disposal of petroleum products has occurred.

SITE REPORTS

Section B1

BARREN RIVER LOCK AND DAM NO. 1

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1.0 INTRODUCTION

Barren River Lock and Dam No. 1 (B1) is located just upstream of Greencastle, in Warren County, 15 miles above the mouth of the Barren River. The site occupies approximately 16.63 acres on the right descending bank (east bank). Improvements at the site include the lock, dam, esplanade, and operations building. The original lock and dam was built in 1841 and acquired by the United States on February 20, 1886. The current lock and dam was built 1933-1934 and operations commenced on September 17, 1934. Operations ceased May 24, 1965.

The Corps is considering disposing of the federal interest in B1 due to a lack of any continued project purpose. The purpose of this EBS is to characterize the environmental baseline condition of the property in order to facilitate the possible disposal and to identify any potential environmental impacts posed by a transfer of the property from Corps ownership.

2.0 METHODOLOGY

2.1 Federal, State, and Local Records

The Vista report for this project is presented in Appendix B1-A.

2.2 Site Investigation

G.E.C. personnel conducted a thorough investigation of the property on January 26, 2000. An EBS checklist completed during the investigation is presented in Appendix B1-B. Photographs taken during the investigation are presented in Appendix B1-C.

2.3 Historical Use Information

For this project G.E.C. reviewed maps dating back to 1954. Maps reviewed:

7.5' Hadley, Kentucky	1954
7.5' Hadley, Kentucky	1973

3.0 SITE DESCRIPTION

3.1 Location

B1 is located approximately one mile upstream of Greencastle, in Warren County, Kentucky, 15 miles above the mouth of the Barren River. A site location map is presented in Figure B1-1 and an aerial photograph is presented in Figure B1-2.

3.2 Site and Vicinity Characteristics

The 16.63-acre site is accessed by taking Greencastle-Richardsville Road west from Kentucky Highway 263. Entrance to the site is via a gated dirt road that proceeds south and west from a boat ramp and parking lot adjacent to Taylor Creek. The site is utilized for hay production and appears to be comprised of fill that is approximately 12-15 feet above natural ground.

Figure B1-1. Site Location Map

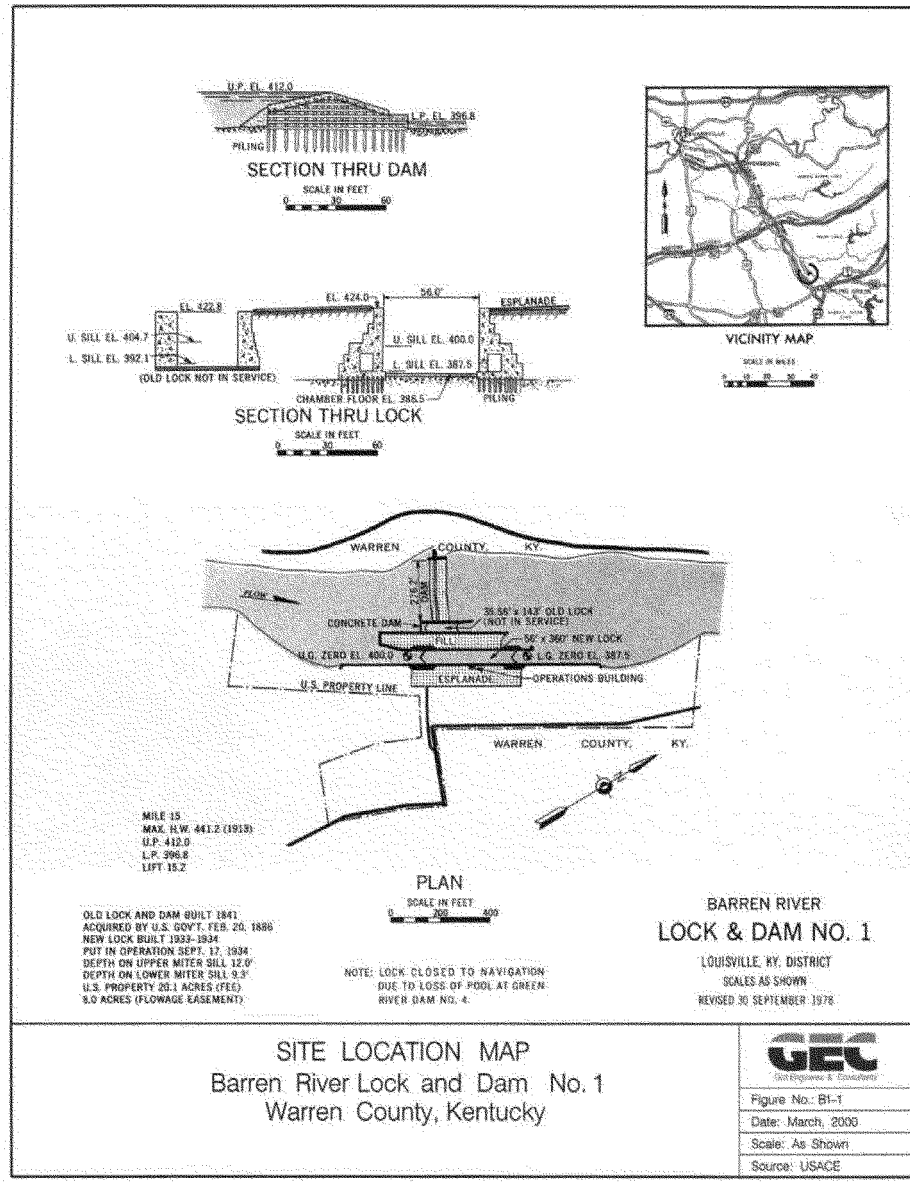
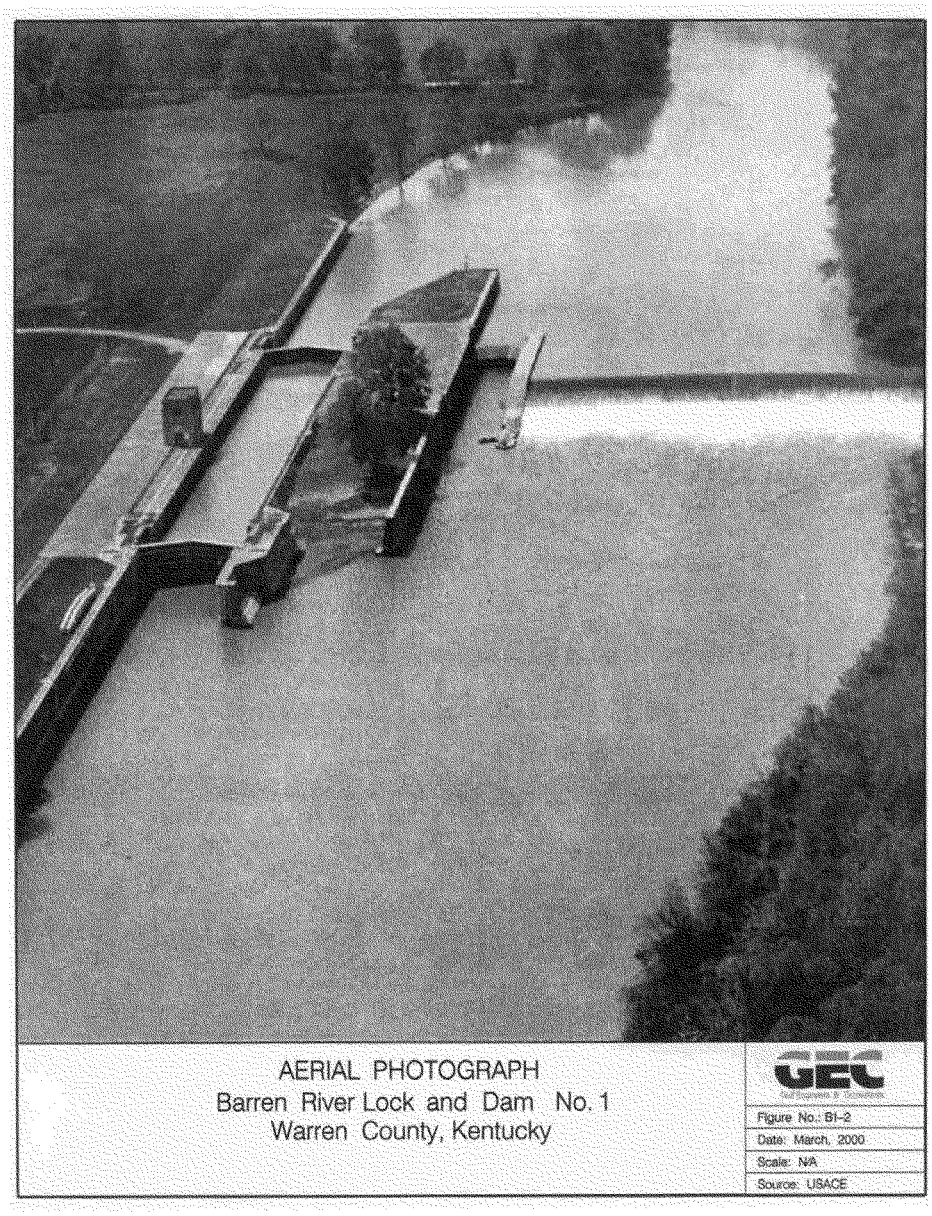


Figure B1-2. Aerial Photograph



B1 was constructed in the19th century to provide slack water navigation on the Barren River and to enhance water supply for Bowling Green, Kentucky. The original lock and dam was put into operation in 1841 and acquired by the United States on February 20, 1886. The current lock and dam was built 1933-1934. Operations ceased May 24, 1965 due to a loss of pool at G4. Improvements at the site include the lock, dam, esplanade, and operations building. There are no minerals of any value at the site.

Elevation at the property is 420-430 feet, and storm water runoff flows west across the property into the Barren River.

3.3 Structures, Roads, and Other Improvements

The site is not fenced but the access road is gated.

Overhead electrical service transits the site, along the access road, however no electrical transformers were observed, and no other utilities were noted during the field investigation.

The only remaining improvements at the site include the lock, dam, an earlier lock, an operations building, and the esplanade. The old lock and dam was left intact and the new lock was built adjacent to, and east of, the older one. The old lock measures 35.6 feet wide and 143 feet long. The new, larger lock measures 56 feet wide and 360 feet long. The dam is fixed. Upper pool elevation is 412.0 feet and lower pool elevation, prior to the breach at G4, was 396.8 feet.

3.4 Past Use of the Property

Figure B1-3 presents locations of the parcels described in this section. The original lock and dam were built in 1841, and acquired by the United States on February 20, 1886.

The state of Kentucky ceded Parcel A, 15.00 acres fee, to the United States. The United States condemned the parcel in 1895 to clear title.

Parcel B, 13.1 acres fee, was acquired from Charles E. and Hester Miller by deed dated August 11, 1933, recorded September 8, 1933, in deed book 172, page 367, in the records of Warren County.

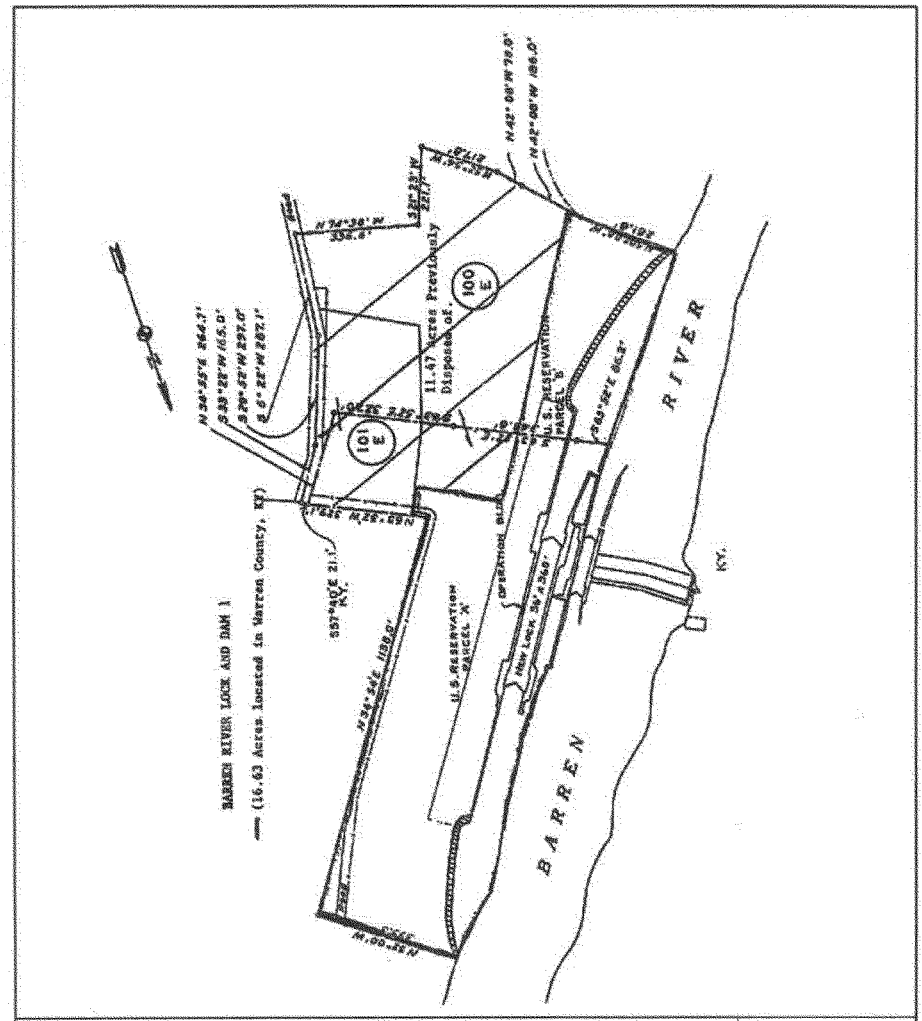
In 1933-1934 the current lock and dam were built adjacent to the old lock and dam, which was left intact. Operation of the new structure commenced on September 17, 1934.

Operations ceased May 24, 1965, due to a loss of pool at Green River Lock and Dam No. 4.

Portions of both parcels have been disposed of. The United States conveyed 3.47 acres of fee land and eight buildings from Parcel A to George W. and Barbara l. Inman by quitclaim deed dated January 20, 1975. No reservations to the United States were included in the quitclaim deed.

The United States conveyed 8.00 acres of fee land from Parcel B to James C. Long by quitclaim deed dated April 9, 1955, together with a 30-foot right-of-way easement to Barren River

Figure B1-3. Real Estate Parcels Map



for watering livestock. In accordance with the quitclaim deed, the right of way is void due to nonuse. The United States also reserved a perpetual flowage easement and right of way for government-owned roads and utilities over the entire 8.0 acres.

One outgrant, permit no. DACW27-4-95-30, was issued to the 160th Special Operations (Aviation) Division, Fort Campbell, Kentucky, for land navigation training. The permit expired December 31, 1999.

3.5 Current Use of the Property

B1 is currently unused and considered excess to the needs of the U.S. Government. The Corps is considering disposing of the federal interest in the facility due to a lack of any continued project purpose. There are no Corps employees or contractors at the site.

The remaining government structures present an attractive nuisance and they are subject to vandalism. The property itself is currently used for hay production.

The highest and best use of the land is considered to be recreational. An appraisal of the property estimates the value of the 16.63 acres owned in fee simple at $16,000. A value of $1 has been assigned to each of the easements.

3.6 Adjoining Property

Land surrounding the site is used for pasture and hay production.

Based on G.E.C.'s review of quadrangle maps, aerial photographs, and land title records, land-use in the vicinity of B1 appears little changed over the last 46 years. A portion of the 1954 quadrangle is presented in Figure B1-4.

4.0 RECORDS REVIEW

A search of federal, state, and local government environmental databases was conducted in order to obtain and review records and documents that would aid in identifying known or potential environmental concerns at, or in the vicinity of, B1. ASTM E1527-97 provides a list of records that should be reviewed and the minimum search distances to use. AR 200-1 requires a search of Department of the Army records.

4.1 Sites Identified During Records Review

Table B1-1 presents a summary of the sites found in each database during the records review.

Figure B1-4. Historic Topographic Map

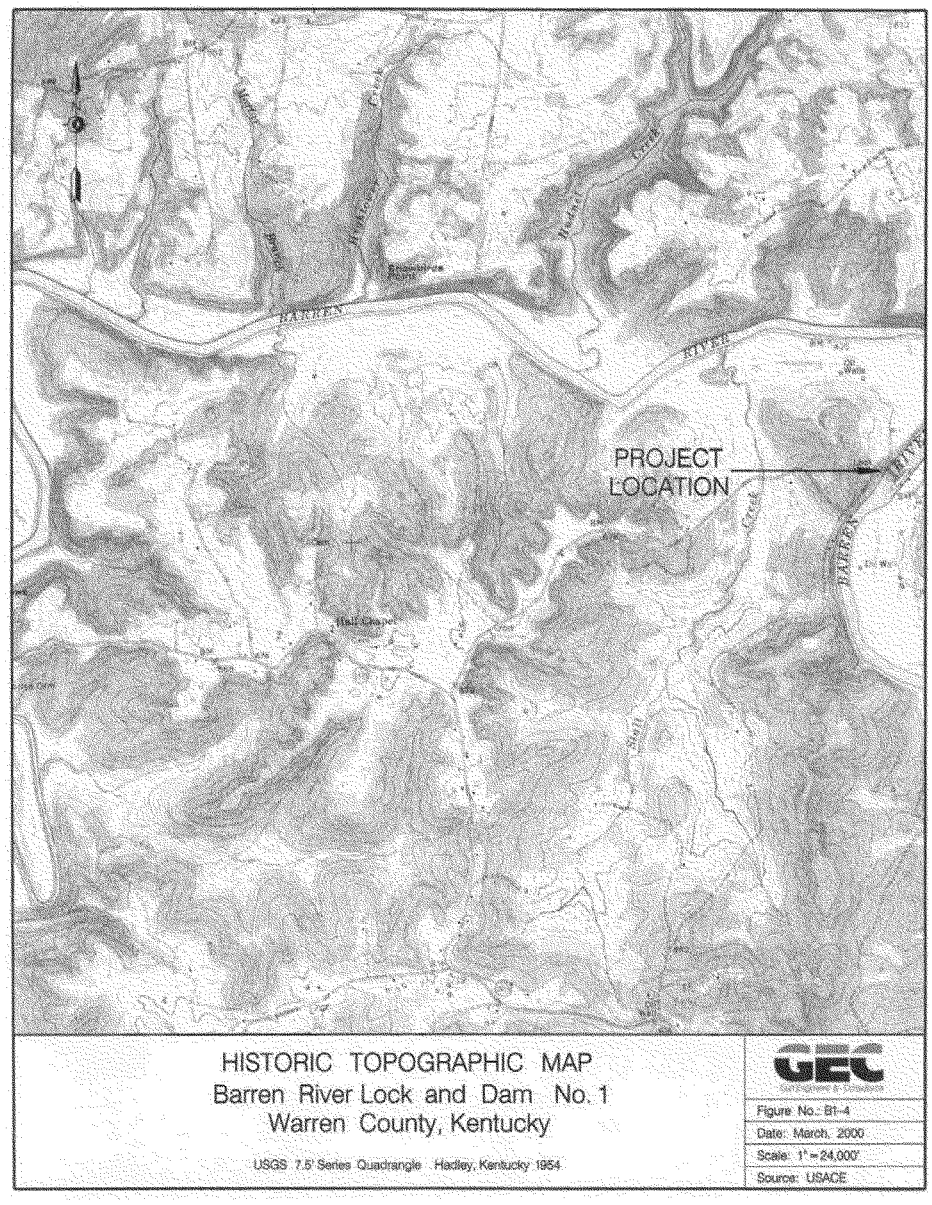


Table B1-1. Federal and State Database Review Summary

Database	< 0.13 Mile	0.13-0.25 Mile	0.25-0.50 Mile	0.50-1.0 Mile	Total
NPL	0	0	0	0	0
RCRIS-CA	0	0	0	0	0
RCRIS-TSD	0	0	0	-	0
CERCLIS	0	0	0	-	0
CERCLIS (S)	0	0	0	-	0
SWLF	0	0	0	-	0
WELLS	0	0	1	-	1
VIOLATERS	0	0	-	-	0
TRIS	0	0	-	-	0
UST/AST	0	0	-	-	0
ERNS	0	-	-	-	0
GNRTR	0	-	-	-	0

Source: G.E.C., February 2000. (-) Outside ASTM-recommended search radius.

The database review resulted in one plottable site within the ASTM-recommended minimum search distances and three unplottable sites. Unplottable sites are those with insufficient location information such that they can only be identified as being within the same zip code as B1. G.E.C. made every effort to locate these sites and assess their relevance to the project.

Of the four sites, three are UST/AST sites. The remaining site is a USGS water well.

5.0 FINDINGS

5.1 Hazardous Substances

This section applies to the storage, handling, transportation, and disposal of substances deemed hazardous under the Resource Conservation Recovery Act (RCRA) at B1.

No evidence of such activity at the site, such as stained soil or distressed vegetation, was noted during the field investigation nor discovered in the process of the federal and state database review.

5.2 Polychlorinated Biphenyls

There are no pole-mounted electrical transformers located at the site and electrical utilities have been disconnected from the operations building, however hydraulic oil released to the environment (Section 5.3) has the potential to contain PCBs. If the structure is removed, analytical investigations of soils under the structure could be warranted.

5.3 Petroleum Products / Petroleum Derivatives

During the field investigation G.E.C. observed hydraulic oil stains in the operations building and at several locations in the lock chamber. The stains are a result of vandalism to the hydraulic piping system, and hydraulic oil has been released to the environment.

G.E.C. found no other evidence or information that the facility ever stored significant amounts of other petroleum products and/or derivatives or that releases of such materials occurred.

It is G.E.C.'s opinion that any hazard to human health or the environment posed by the hydraulic oil releases is low.

5.4 Lead

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the door of the operations building. Should the paint contain lead, conditions at B1 could pose a hazard to human health, and any removal or disturbance of any of the fittings would have to be conducted in accordance with state and local regulations.

5.5 Asbestos

There appear to be no asbestos concerns at the property.

5.6 Air Quality

There are no apparent air quality issues associated with the property.

5.7 Public Safety

The lock walls, miter gates, operations building, and esplanade appear to be in good condition, although G.E.C. observed evidence of seepage through and around the land-side lock wall. However, several of the bulkhead valve and piping pits are no longer covered with grating, and because the site is not secure from public access, these and other falling/drowning hazards present a liability associated with continued ownership of the site.

5.8 Potential Sites of Concern

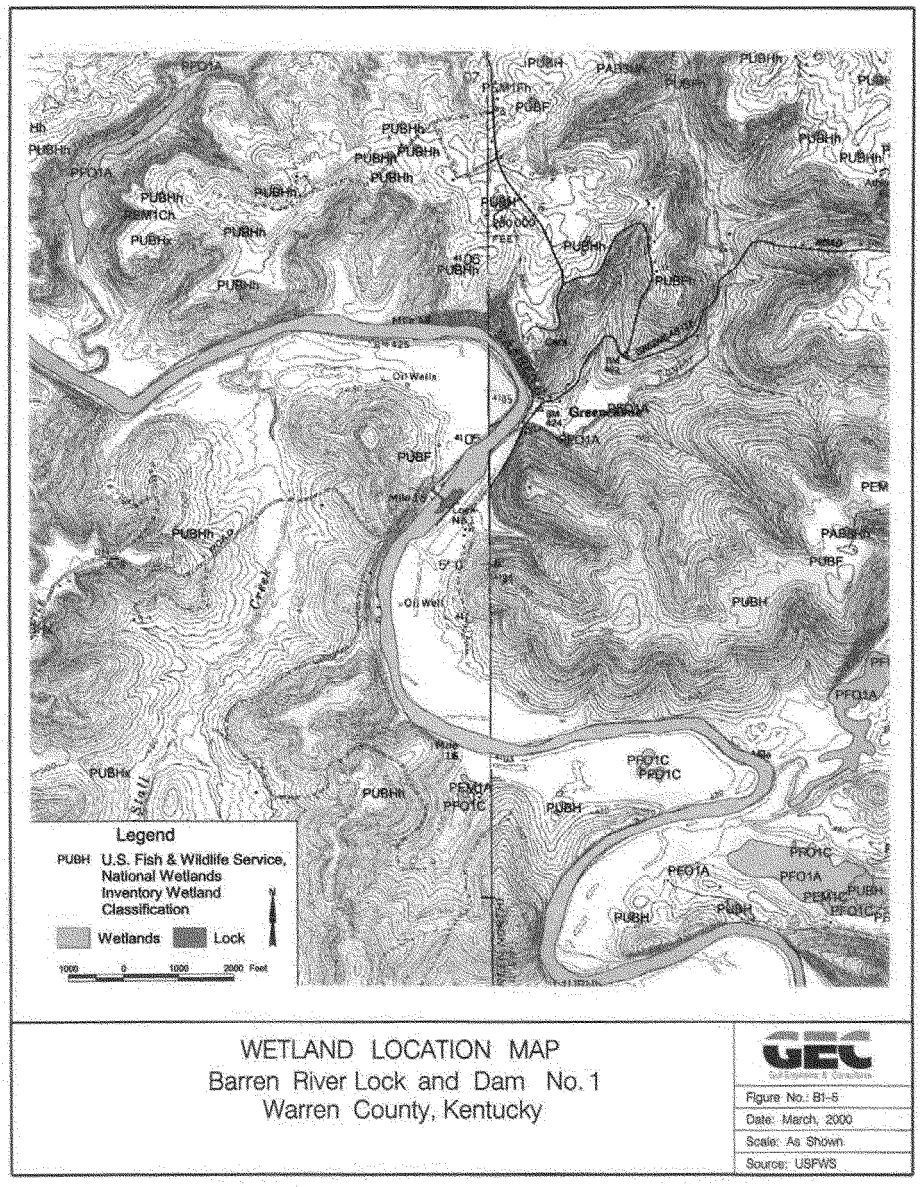
G.E.C. was unable to locate the three UST/AST sites, however they were not observed in the vicinity of the site. As a result, it is G.E.C.'s opinion that none of the three are likely to have had an impact on environmental conditions at B1.

5.9 Federal and State Agency Evaluations

5.9.1 Wetlands

A Department of the Interior National Wetlands Inventory Map dated 1988, a portion of which is presented in Figure B1-5, indicates a forested palustrian wetland at the site, in the form of a narrow riparian zone adjacent to the river. G.E.C. confirmed this during the field investigation, as well as the presence of another palustrian wetland, upstream of the lock on the right descending

Figure B1-5. NWI Map



bank. The area, less than one acre in size, is dominated by red maple and consists of a seasonally flooded water regime that holds backwater during periods of high flow.

5.9.2 Cultural Resources

A Phase I Cultural Resources Reconnaissance was performed in 1998 for the site to determine if any archaeological resources would be impacted by federal disposal of the property. The reconnaissance found no evidence of prehistoric or undisturbed historic era cultural remains. Efforts are currently underway to document the existing structures at the facility and coordinate the results of the studies with the Kentucky Heritage Council. To date, the District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. The District expects that the facility will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

5.9.3 Threatened and Endangered Species

Threatened and endangered species occur in the Green and Barren rivers and on adjacent terrestrial habitat. The federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system, portions of which are located within the pool created by G6, and the U.S. Fish and Wildlife Service (USFWS) has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the species.

Caves in the study area also provide habitat for the federally endangered gray bat and Indiana bat, which use the caves as hibernacula. One cave within the study area is known to support a gray bat maternity colony, and future surveys in additional caves may find other maternity colonies. Suitable habitat for Indiana bat maternity colonies also exists throughout the project area, and additional studies may confirm their presence.

The study project area also contains habitat for a variety of federally listed species of birds. Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range. The Federally endangered American peregrine falcon (*Falco peregrinus anatum*) also occurs as a migrant or transient in the study area.

Endangered freshwater mussels in the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma*

torulosa rangiana), pink mucket pearly mussel (*Lampsilis abrupta*), and the fanshell (*Cyprogenia stegaria*). Recently deceased specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have also been observed, indicating their presence in the project area as well. Other listed mussel species that might still occur in the project area include the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Edpioblasma sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussels still reproduce in the Green River, and it is thought that this is one of the few, perhaps the only, rivers in which this occurs.

Federally threatened plants found in the study area include Price's potato bean (*Apios priceana*) and Eggert's sunflower (*Helianthus eggertii*).

Rare species for which potential habitat exists in the project area include the southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*Myotis leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*), eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender, Kirtland's water snake (*Clonophis kirtlandi*), cooperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), spectacle case pearly mussel (*Cumberlandia monodonta*), Kentucky creekshell mussel (*Villosa ortnanni*), rabbit's foot pearly mussel (*Ouadrula cylindrica*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). These species are not currently considered candidate species, however, they could be listed in the future if their numbers decline and threats to their survival persist.

6.0 SUMMARY AND CONCLUSION

B1 is located just upstream of Greencastle, in Warren County, 15 miles above the mouth of the Barren River. The site occupies approximately 16.63 acres on the right descending bank. Improvements at the site include the lock, dam, esplanade, and operations building. The original lock and dam was built in 1841 and acquired by the United States on February 20, 1886. The current lock and dam were built 1933-1934 and operations commenced on September 17, 1934. Operations ceased May 24, 1965.

The Corps is considering disposing of federal interest in the facility due to a lack of any continued project purpose, and G.E.C. was contracted to conduct an EBS in order to facilitate the possible disposal. In accordance with applicable requirements contained in AR 200-1 and ASTM E1527-97, G.E.C. reviewed Department of the Army records and federal, state, and local databases,

federal and state agency evaluations, conducted historical research of the site and surrounding area, interviewed pertinent personnel, and performed a site investigation in order to characterize environmental conditions at the site.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at the site.

There are no pole-mounted electrical transformers located at the site and electrical utilities have been disconnected from the operations building, however hydraulic oil released to the environment (Section 5.3) has the potential to contain PCBs. If the structure is removed, analytical investigations of soils under the structure could be warranted.

There is no evidence that the site ever stored significant amounts of petroleum products and/or derivatives, however G.E.C. observed hydraulic oil stains in the lock chamber and operations building. The stains are a result of vandalism to hydraulic piping systems at the facility. Although hydraulic oil was released to the environment, it is G.E.C.'s opinion that any hazard posed to human health or the environment is low.

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the door of the operations building. Should the paint contain lead, conditions at B1 could pose a hazard to human health, and any removal or disturbance of any of the fittings would have to be conducted in accordance with state and local regulations.

There appear to be no asbestos or air quality concerns at the site.

The lock, dam, and operations building appear to be in fair condition. However, due to obvious falling/drowning hazards, and because the site is not secure from public access, there is a potential liability associated with continued ownership of the site.

Three unplottable sites of potential concern were found during the federal and state database review. G.E.C. believes that none of the three are likely to have had any impact on environmental conditions at B1.

G.E.C. observed forested palustrian wetlands at the site, and threatened and endangered species are known to occur in the vicinity.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of the site, however the improvements at B1 may themselves be potentially eligible for listing in the National Register of Historic Places.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, B1 is a Category 2 site, an area where only release or disposal of petroleum products has occurred.

Section G3

GREEN RIVER LOCK AND DAM NO. 3

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1.0 INTRODUCTION

G3 is located just downstream of Rochester, Kentucky, 108.5 miles above the mouth of the Green River. The site occupies approximately 4.99 acres on the left descending bank (west bank, Muhlenberg County), and 6.72 acres located on the right descending bank (east bank, Ohio County). Improvements at the site include the lock and dam, and the remains of a residence, warehouse, garage, well, and septic tank, all on the right descending bank. The original lock was built in 1833-1836 and acquired by the United States on February 4, 1895. Locking operations were discontinued in September 1981.

The Corps is considering disposing of the federal interest in G3 due to a lack of any continued authorized project purpose. The purpose of this EBS is to characterize the environmental baseline condition of the property in order to facilitate the possible disposal and to identify any potential environmental impacts posed by a transfer of the property from Corps ownership.

2.0 METHODOLOGY

2.1 Federal, State, and , Local Records

The Vista report for this project is presented in Appendix G3-A.

2.2 Site Investigation

G.E.C. personnel conducted a thorough investigation of the property on January 26, 2000. An EBS checklist completed during the investigation is presented in Appendix G3-B. Photographs taken during the investigation are presented in Appendix G3-C.

2.3 Historical Use Information

For this project G.E.C. reviewed the 1953 7.5-minute Rochester, Kentucky quadrangle.

3.0 SITE DESCRIPTION

3.1 Location

G3 is located just downstream of Rochester, in Muhlenberg and Ohio counties, Kentucky, 108.5 miles above the mouth of the Green River, and approximately 600 feet downstream of the Mud River's confluence with the Green. A site location map is presented in Figure G3-1 and an aerial photograph is presented in Figure G3-2.

3.2 Site and Vicinity Characteristics

The 4.99-acre tract in Muhlenberg County lies alongside Kentucky Highway 70. The site consists primarily of an improved gravel parking lot. A small bottomland area is south of the parking lot, towards the Mud River. The northern portion of the site is comprised of a sandstone bluff.

The 6.72-acre tract in Ohio County is accessed by taking an unnamed improved road west from Kentucky Highway 369. The majority of the site consists of level cleared land.

Figure G3-1. Site Location Map

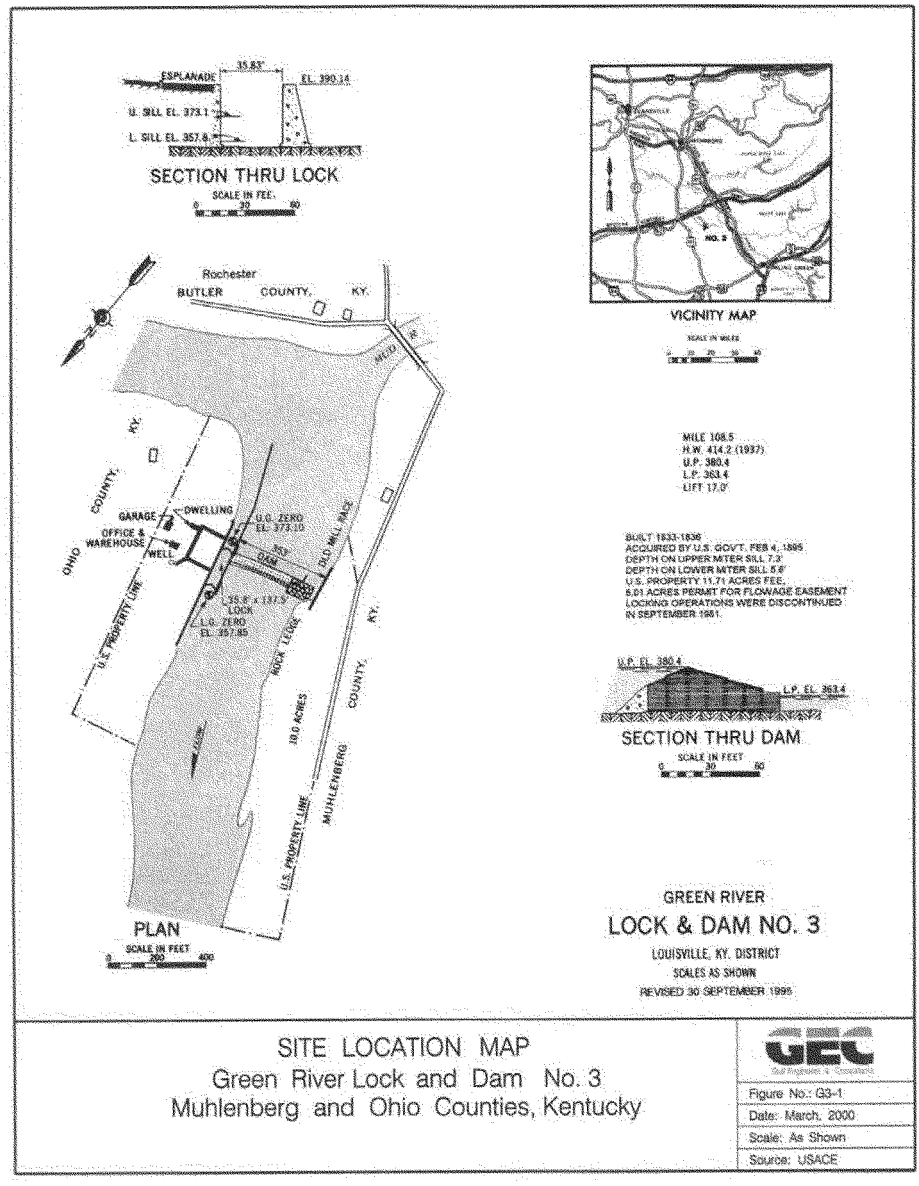
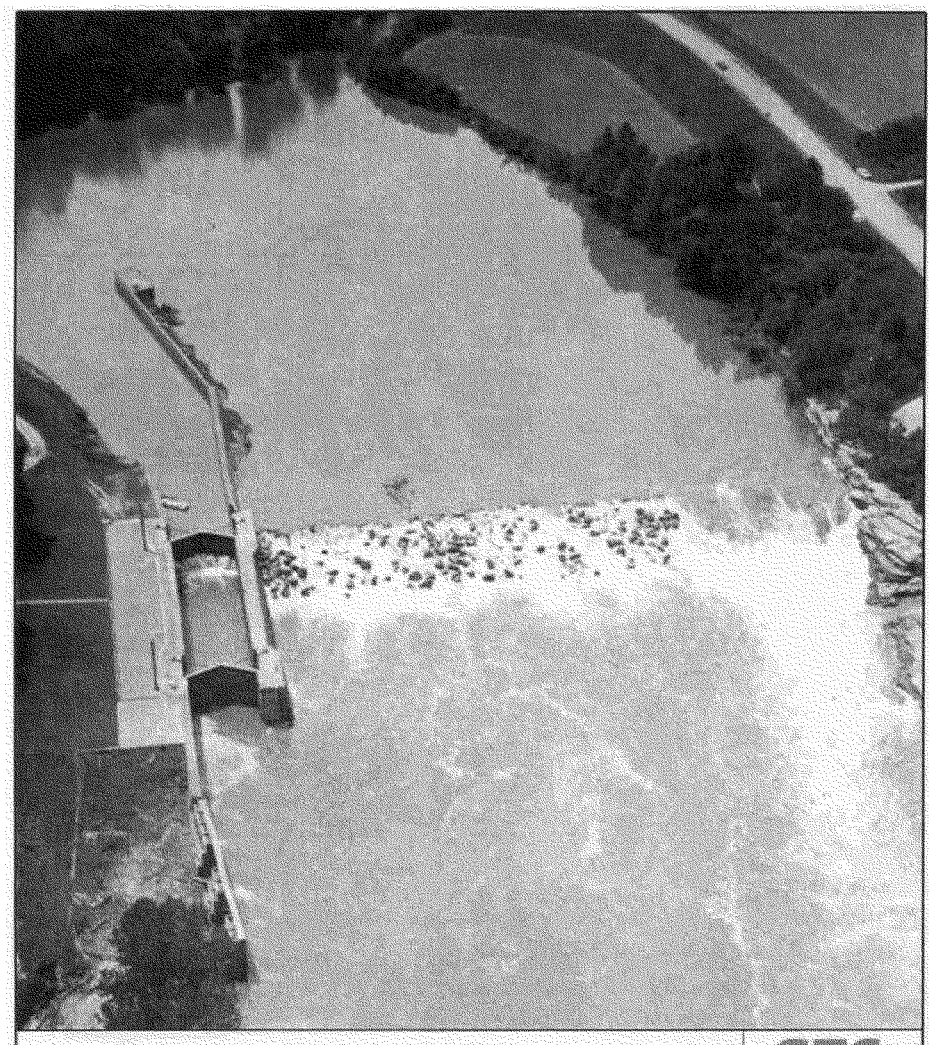


Figure G3-2. Aerial Photograph



AERIAL PHOTOGRAPH
Green River Lock and Dam No. 3
Muhlenberg and Ohio Counties, Kentucky

GEC
Figure No.: G3-2
Date: March, 2000
Scale: N/A
Source: USACE

G3 was constructed at the turn of the century to provide slack water navigation on the Green River. The original lock was built in 1833-1836 and acquired by the United States on February 4, 1895. Locking operations were discontinued in September 1981. Improvements at the site include the lock and dam, and the remains of a residence, warehouse, garage, well, and septic tank, all on the right descending bank. There are no minerals of any value at the site.

Elevation at the property is 395-400 feet, and storm water runoff flows across the property into the Green River.

3.3 Structures, Roads, and Other Improvements

Neither tract is fenced or gated.

Overhead electrical service transits the 6.72-acre tract. No utilities were observed at the 4.99-acre tract.

The facility originally contained several improvements on the right descending bank, including the lock and dam, two residences, a warehouse, two chicken houses, two coal houses, and two toilets. The only remaining improvements are the lock and dam, one residence, the warehouse, garage, well, and septic tank.

The lock is 35.8 feet wide and 137.5 feet long, and the dam is a fixed-type. Upper pool elevation is 380.4 feet and lower pool elevation is 363.4 feet.

3.4 Past Use of the Property

Figure G3-3 presents locations of the parcels described in this section. Parcel A, comprised of 6.72 acres located in Ohio County, was acquired from Prudence Bowles in February 1895. The 6.72 acres included 3.00 acres ceded by the state of Kentucky and 0.25 acres from J. P. Shrum in a deed dated February 1891.

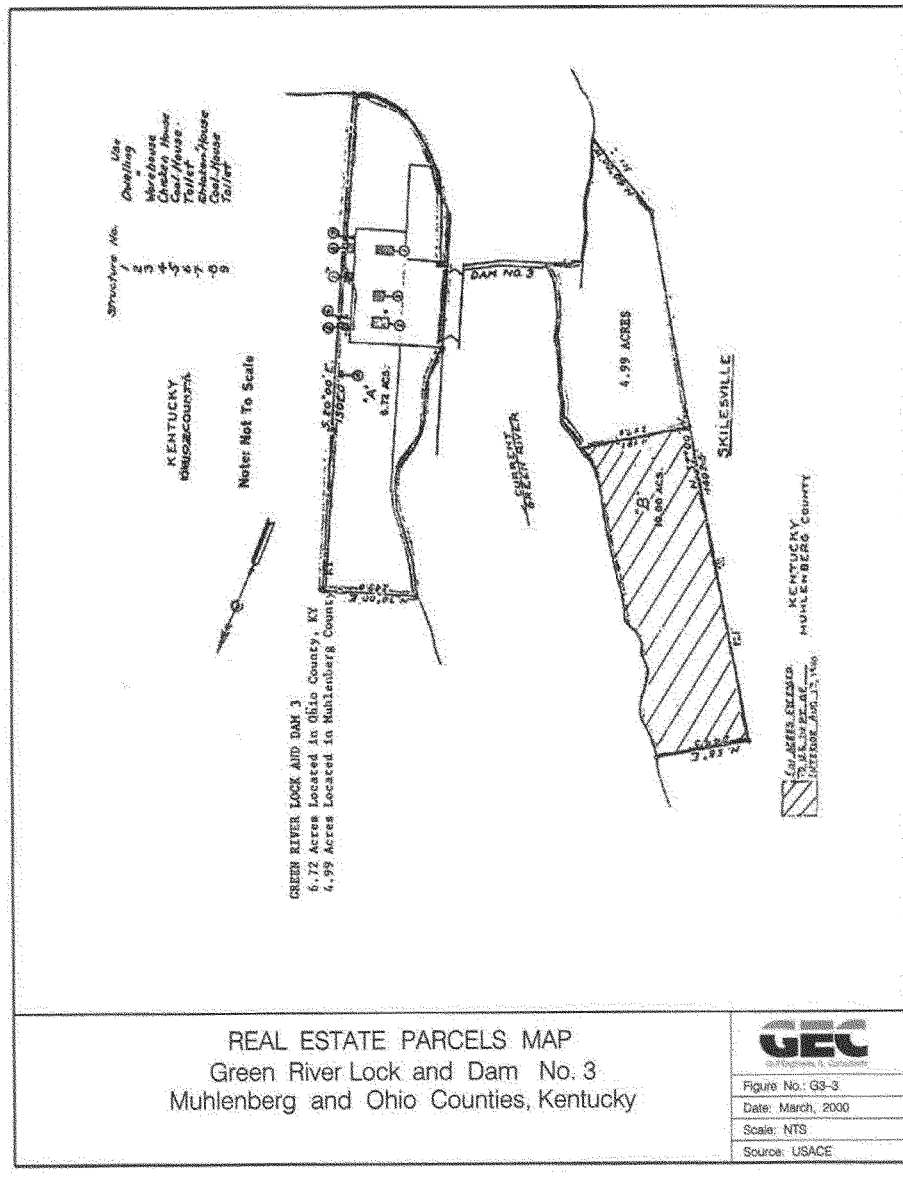
Parcel B, comprised of 10.00 acres located in Muhlenberg County, Kentucky, was ceded to the United States by the state of Kentucky on February 29, 1886.

A portion of Parcel B, consisting of 5.01 acres, was conveyed to Muhlenberg County for use as a public park and recreation. The United States reserved the mineral rights, a perpetual flowage easement, right-of-way for construction and maintenance, and the right to erode the riverbank. The deed provides that title shall revert to the United States if needed for national defense purposes.

The United States currently owns and 4.99 acres in fee simple along with 5.01 acres of perpetual flowage easement and right-of-way for construction and maintenance in Muhlenberg County and 6.72 acres in fee simple in Ohio County.

There are no outgrants associated with the site.

Figure G3-3. Real Estate Parcels Map



3.5 Current Use of the Property

G3 is currently deactivated and considered excess to the needs of the U.S. Government. The Corps is considering disposing of the federal interest in the facility due to a lack of any continued authorized project purpose. There are no Corps employees or contractors at the site, although the 6.72-acre tract is mowed during summer months.

The property on the right descending bank is an attractive nuisance and is used for illegal dumping. Household trash was observed throughout the property, and the three remaining structures have been severely vandalized.

The highest and best use of the 6.72 acres in Ohio County is considered residential. An appraisal of the property has estimated the value at $10,000. The highest and best use of the 4.99 acres in Muhlenberg County is considered recreational. An appraisal of the property has estimated the value at $6,000. A value of $1 has been assigned to each of the easements.

3.6 Adjoining Property

Land adjacent to the 6.72 acres in Ohio County is residential and agricultural to the east and undeveloped scrub shrub woodland to the north. Land adjacent to the 4.99 acres in Muhlenberg County is residential.

Based on G.E.C.'s review of the quadrangle map, aerial photographs, and land title records, land-use in the vicinity of G5 appears little changed over the last 47 years. A portion of the 1953 quadrangle is presented in Figure G3-4.

4.0 RECORDS REVIEW

A search of federal, state, and local government environmental databases was conducted in order to obtain and review records and documents that would aid in identifying known or potential environmental concerns at, or in the vicinity of, G3. ASTM E1527-97 provides a list of records that should be reviewed and the minimum search distances to use. AR 200-1 requires a search of Department of the Army records.

4.1 Sites Identified During Records Review

Table G3-1 presents a summary of the sites found in each database during the records review.

Figure G3-4. Historic Topographic Map

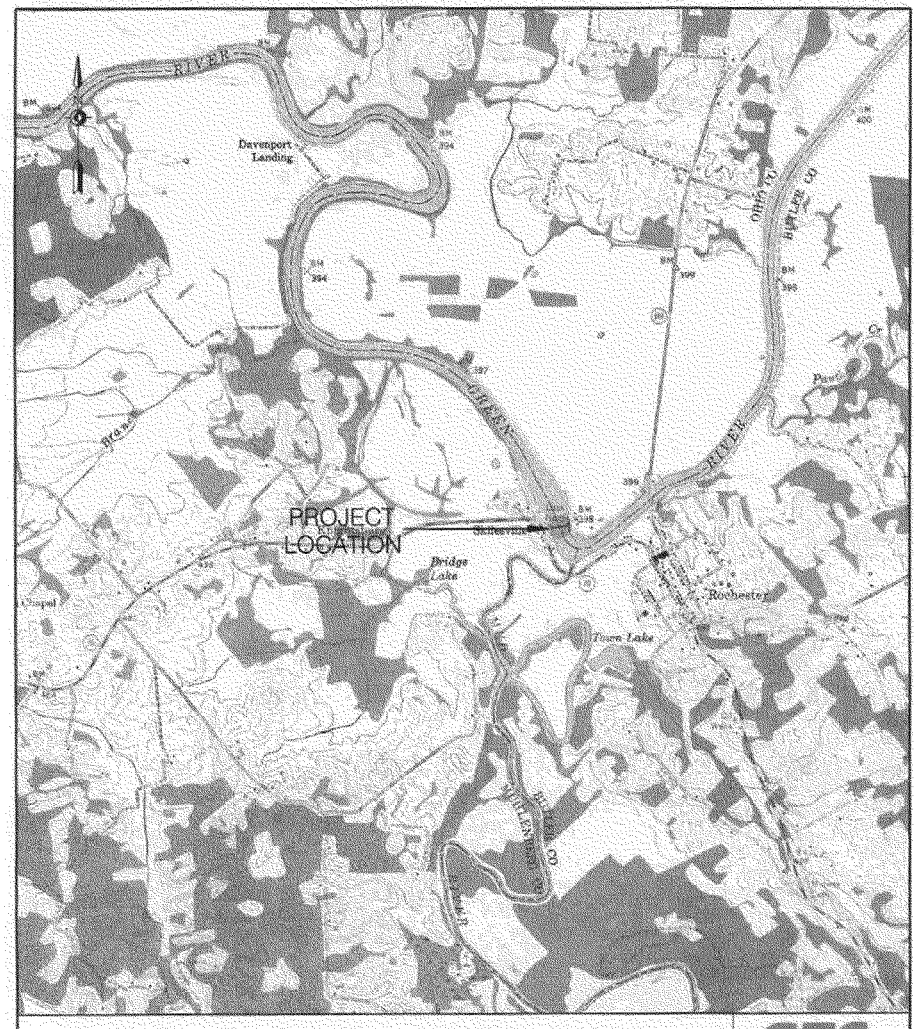


Table G3-1. Federal and State Database Review Summary

Database	< 0.13 Mile	0.13-0.25 Mile	0.25-0.50 Mile	0.50-1.0 Mile	Total
NPL	0	0	0	0	0
RCRIS-CA	0	0	0	0	0
RCRIS-TSD	0	0	0	-	0
CERCLIS	0	0	0	-	0
CERCLIS (S)	0	0	0	-	0
SWLF	0	0	0	-	0
WELLS	0	0	0	-	0
VIOLATERS	0	0	-	-	0
TRIS	0	0	-	-	0
UST/AST	0	1	-	-	1
ERNS	0	-	-	-	0
GNRTR	0	-	-	-	0

Source: G.E.C., February 2000. (-) Outside ASTM-recommended search radius.

The database review resulted in one plottable site within the ASTM-recommended minimum search distance and 13 unplottable sites. Unplottable sites are those with insufficient location information such that they can only be identified as being within the same zip code as G3. G.E.C. made every effort to locate these sites and assess their relevance to the project.

Of the 13 unplottabe sites, 5 are UST/AST sites. The remaining eight are solid waste landfill facilities.

5.0 FINDINGS

5.1 Hazardous Substances

This section applies to the storage, handling, transportation, and disposal of substances deemed hazardous under the Resource Conservation Recovery Act (RCRA) at G3.

No evidence of such activity at the site, such as stained soil or distressed vegetation, was noted during the field investigation nor discovered in the process of the federal and state database review.

5.2 Polychlorinated Biphenyls

There are no pole-mounted electrical transformers located at the site and electrical utilities have been disconnected from the residence. It is G.E.C.'s opinion that no hazard is posed to human health or the environment.

5.3 Petroleum Products / Petroleum Derivatives

G.E.C. could find no information in the course of the records review or field investigation that the facility ever stored significant amounts of petroleum products and/or derivatives or that a release of such material ever occurred. Accordingly, it is G.E.C.'s opinion that there are no hazards to human health or the environment.

5.4 Lead

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the three remaining structures. Should the paint contain lead, conditions at G3 could pose a hazard to human health, and removal or disturbance of any of the fittings would have to be conducted in accordance with state and local regulations.

5.5 Asbestos

Possible asbestos containing material, in the form of ceiling tiles, was observed in the former residence. Should the tiles contain asbestos, conditions in the residence could pose a hazard to human health. Disturbance or removal of the residence would have to be conducted in accordance with state and local regulations.

5.6 Air Quality

Other than the possible asbestos containing material, there are no apparent air quality issues associated with the property.

5.7 Public Safety

With the exception of the timber portion of the downstream guide wall, which appears to be in a state of failure, the majority of the project appears to be in satisfactory condition. The wall has settled and rotated riverward, and it appears the wall will fail completely in the near future.

The walls of the lock, constructed of cut stone masonry, show signs of significant surficial weathering, however they show no evidence of settlement or movement. The esplanade, although cracked, can still adequately support light cars and trucks. However, due to obvious falling/drowning hazards, and because the site is not secure from public access, there may be liability associated with ownership of the site.

5.8 Potential Sites of Concern

G.E.C. was able to locate all of the UST/AST sites (one plottable and five unplottable) and they are outside the ASTM-recommended search distance.

G.E.C. was unable to locate any of the eight solid waste landfill facilities, however they were not observed in the vicinity of the site. This was confirmed by information provided during interviews, when local residents indicated that none of the sites were located near G3. As a result, it

is G.E.C.s opinion that none of the 14 sites are likely to have had any impact on environmental conditions at G3.

5.9 Federal and State Agency Evaluations

5.9.1 Wetlands

A Department of the Interior National Wetlands Inventory Map dated 1988, a portion of which is presented in Figure G3-5, indicates a forested palustrian wetland at the site, in the form of narrow riparian zones adjacent to the river. G.E.C. confirmed this during the field investigation.

5.9.2 Cultural Resources

A Phase I Cultural Resources Reconnaissance was performed in 1998 for the site to determine if any archaeological resources would be impacted by federal disposal of the property. The reconnaissance found no evidence of prehistoric or undisturbed historic era cultural remains. Efforts are currently underway to document the existing structures at the facility. To date, the District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. The District expects that the facility will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

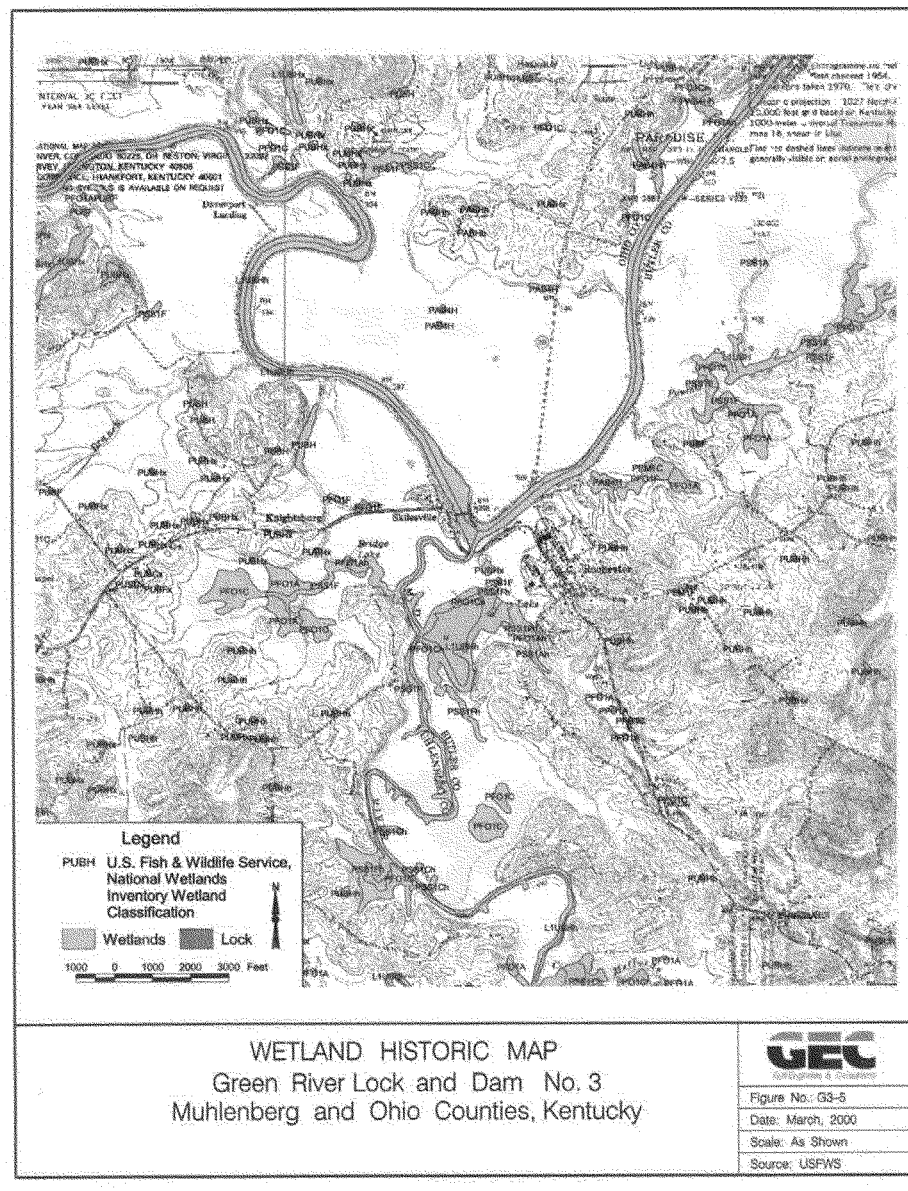
5.9.3 Threatened and Endangered Species

Threatened and endangered species occur in the Green and Barren rivers and on adjacent terrestrial habitat. The Federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system, portions of which are located within the pool created by G6, and the U.S. Fish and Wildlife Service (USFWS) has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the species.

Caves in the study area also provide habitat for the federally endangered gray bat and Indiana bat, which use the caves as hibernacula. One cave within the study area is known to support a gray bat maternity colony, and future surveys in additional caves may find other maternity colonies. Suitable habitat for Indiana bat maternity colonies also exists throughout the project area, and additional studies may confirm their presence.

The study project area also contains habitat for a variety of federally listed species of birds. Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range. The

Figure G3-5. NWI Map.



Federally endangered American peregrine falcon (*Falco peregrinus anatum*) also occurs as a migrant or transient in the study area.

Endangered freshwater mussels in the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket pearly mussel (*Lampsilis abrupta*), and the fanshell (*Cyprogenia stegaria*). Recently deceased specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have also been observed, indicating their presence in the project area as well. Other listed mussel species that might still occur in the project area include the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Edpioblasma sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussels still reproduce in the Green River, and it is thought that this is one of the few, perhaps the only, rivers where this occurs.

Federally threatened plants found in the study area include Price's potato bean (*Apios priceana*) and Eggert's sunflower (*Helianthus eggertii*).

Rare species for which potential habitat exists in the project area include the southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*Myotis leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*), eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender, Kirtland's water snake (*Clonophis kirtlandi*), cooperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), spectacle case pearly mussel (*Cumberlandia monodonta*), Kentucky creekshell mussel (*Villosa ortmanni*), rabbit's foot pearly mussel (*Ouadrula cylindrica*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). These species are not currently considered candidate species, however, they could be listed in the future if their numbers decline and threats to their survival persist.

6.0 SUMMARY AND CONCLUSION

G3 is located just downstream of Rochester, Kentucky, 108.5 miles above the mouth of the Green River. The site occupies approximately 4.99 acres in Muhlenberg County, and 6.72 acres in Ohio County. Improvements at the site include the lock and dam, and the remains of a residence, warehouse, garage, well, and septic tank, all on the right descending bank. The original lock was built in 1833-1836 and acquired by the United States on February 4, 1895. Locking operations were discontinued in September 1981.

The Corps is considering disposing of the federal interest in the facility due to a lack of any continued authorized project purpose, and G.E.C. was contracted to conduct an EBS in order to facilitate the possible disposal. In accordance with applicable requirements contained in AR 200-1 and ASTM E1527-97, G.E.C. reviewed Department of the Army records and federal, state, and local databases, federal and state agency evaluations, conducted historical research of the site and surrounding area, interviewed pertinent personnel, and performed a site investigation in order to characterize environmental conditions at the site.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at the site.

There is no evidence suggesting the presence of PCBs at the site.

There is no evidence that the facility ever stored significant amounts of petroleum products and/or derivatives or that a release of such material ever occurred.

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the three remaining structures. Should the paint contain lead, conditions at G3 could pose a hazard to human health, and removal or disturbance of any of the fittings would have to be conducted in accordance with state and local regulations.

Possible asbestos containing material, in the form of ceiling tiles, was observed in the former residence. Should the tiles contain asbestos, conditions in the residence could pose a hazard to human health. Disturbance or removal of the residence would have to be conducted in accordance with state and local regulations.

There appear to be no air quality concerns at the site other than the possible asbestos-containing material.

With the exception of the timber portion of the downstream guide wall, which appears to be in a state of failure, the majority of the project appears to be in satisfactory condition. However, due to obvious falling/drowning hazards, and because the site is not secure from public access, there may be liability associated with continued ownership of the site.

Fourteen sites of potential concern were found during the federal and state database review. G.E.C. located six of the 14 and they are outside of the ASTM-recommended search distances. There is reason to believe the remaining eight sites are also located well away from the site. In any event, it is unlikely that any of the 14 sites has had an impact on conditions at G3.

G.E.C. observed forested palustrian wetlands at the site, and threatened and endangered species are known to occur in the vicinity.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of the site, however the improvements at G3 may themselves be potentially eligible for listing in the National Register of Historic Places.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, G3 is a Category 1 site, an area where no release or disposal of hazardous substances or petroleum products has occurred, and no migration of these substances from adjacent areas has occurred.

Section G4

GREEN RIVER LOCK AND DAM NO. 4

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1.0 INTRODUCTION

G4 is located at Woodbury, Butler County, Kentucky, 149.0 miles above the mouth of the Green River. Government-owned property at the site consists of the lock and lock walls, and a USGS gauging station on a 0.01-acre tract located on the left descending (west) bank.

The Corps is considering disposing of the federal interest in the 0.01 acre, and the purpose of this EBS is to characterize the environmental baseline condition of the property in order to facilitate the possible disposal and to identify any potential environmental impacts posed by a transfer of the property from the Corps ownership.

2.0 METHODOLOGY

2.1 Federal, State, and Local Records

The Vista report for this project is presented in Appendix G4-A.

2.2 Site Investigation

G.E.C. personnel conducted a thorough investigation of the property on January 25, 2000. An EBS checklist completed during the investigation is presented in Appendix G4-B. Photographs taken during the investigation are presented in Appendix G4-C.

2.3 Historical Use Information

For this project G.E.C. reviewed maps dating back to 1954. Maps reviewed:

7.5' Morgantown, Kentucky	1954
7.5' Morgantown, Kentucky	1973

3.0 SITE DESCRIPTION

3.1 Location

G4 is located at Woodbury, in Butler County, Kentucky, 149.0 miles above the mouth of the Green River. The site is accessed by Kentucky Highway 403/263. A site location map is presented in Figure G4-1 and an aerial photograph is presented in Figure G4-2.

3.2 Site and Vicinity Characteristics

The 0.01-acre site is located on the left descending bank of the Green River immediately upstream of the former lock and dam project. Access to the property is not secured.

Elevation at the property is 400-405 feet, and storm water flows towards the Green River. The riverbank is forested, and herbaceous vegetation and woody shrubs cover the terrace. There are no minerals of any value at the site.

3.3 Structures, Roads, and Other Improvements

The USGS gauging station and the underground electrical utility that supplies its power are the only improvements.

Figure G4-1. Site Location Map

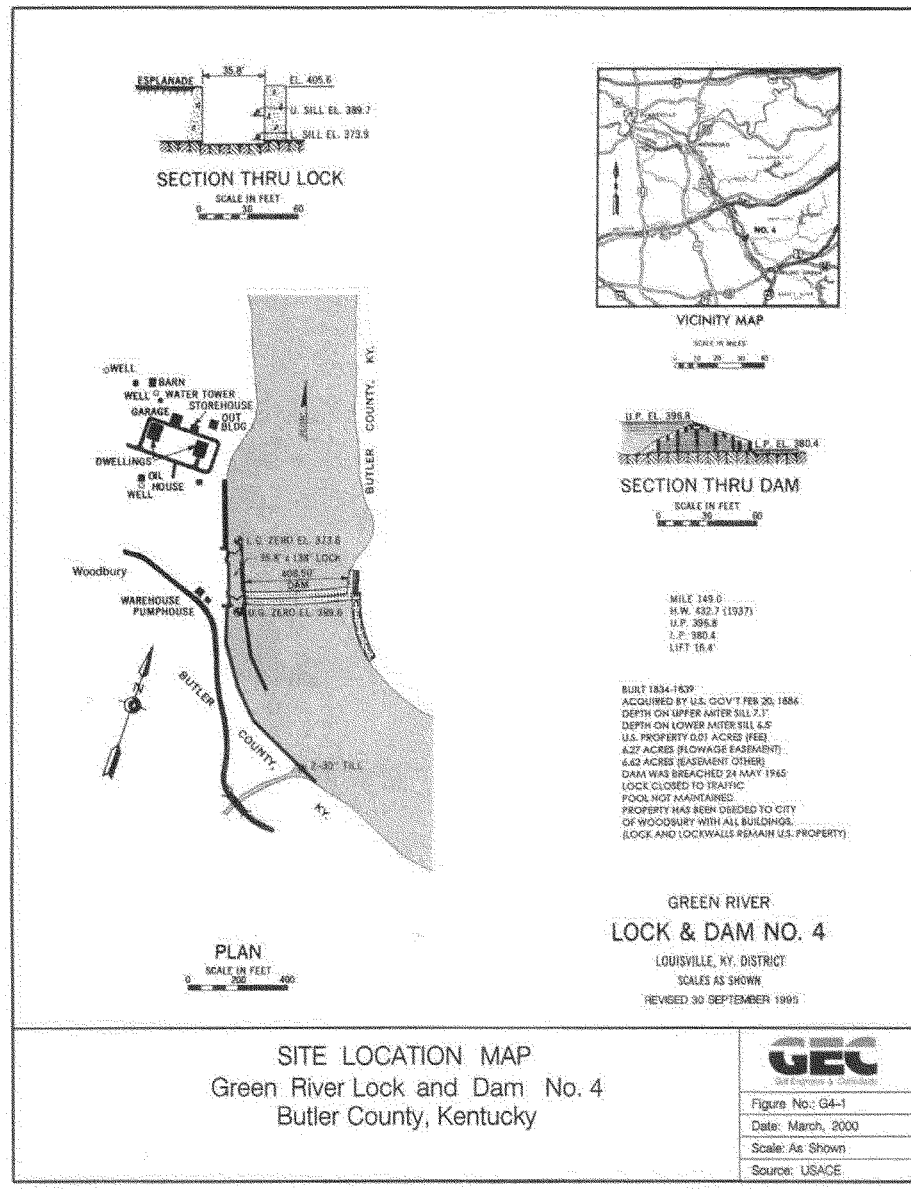
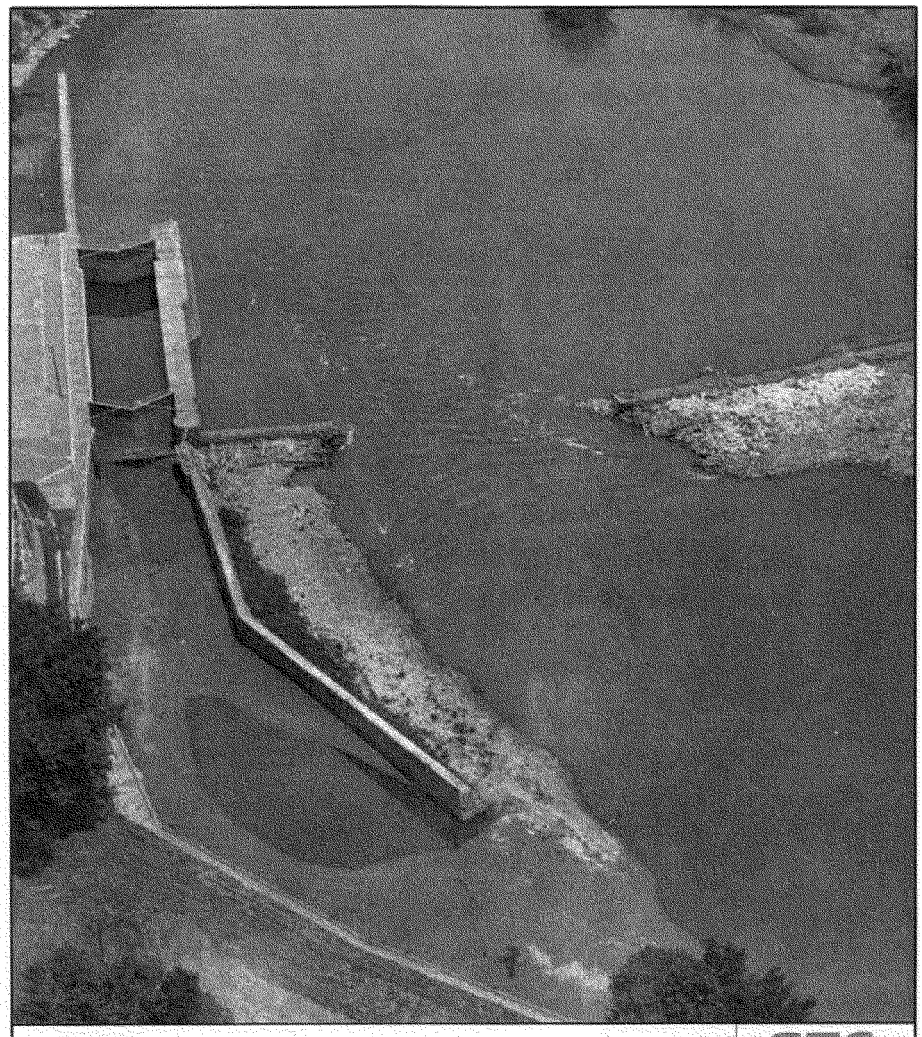


Figure G4-2. Aerial Photograph



AERIAL PHOTOGRAPH
Green River Lock and Dam No. 4
Butler County, Kentucky

GEC
Geotechnical Engineers & Consultants

Figure No.: G4-2
Date: March, 2000
Scale: N/A
Source: USACE

3.4 Past Use of the Property

Figure G4-3 presents locations of the parcels described in this section. Parcel A, consisting of 1.70 acres, was acquired from the Evansville and Bowling Green Packet Company by Commissioner's Deed dated September 25, 1911, recorded in deed book 19, page 366 in the records of Butler County.

Parcel B, 0.50 acres, was acquired from J. W. Newton by Commissioner's Deed dated September 25, 1911, recorded in deed book 19, page 362 in the records of Butler County.

Parcel C, 0.60 acres fee, was acquired from E. C. and Ida L. Kuykendall by Commissioner's Deed dated September 25, 1911, recorded October 11,1911, in deed book 19, page 358 in the records of Butler County.

Parcel D, 13.70 acres fee, was acquired from H. S. McGinis by Commissioner's Deed dated September 25, 1900, recorded in deed book 19, page 353 in the records of Butler County.

Parcel E, 8.61 acres fee, was acquired from the Commonwealth of Kentucky by an act of the general assembly approved February 20, 1886, ceding the same to the United States, and the Green and Barren River Navigation Company by deed dated August 31, 1888.

Parcel F, 1.66 acres fee, was acquired in the same manner as parcel E.

A 3.6-acre portion of Parcels A, C, and E, and all 1.66 acres of Parcel F, for a total of 5.26 acres, were conveyed to Butler County, Kentucky for use as a public park and recreation by quitclaim deed dated November 25, 1987. The United States reserved the mineral rights, a perpetual flowage easement, and right-of-way easement over the entire 5.26 acres. The deed provided that title to the land shall revert to the United States if needed for national defense purposes.

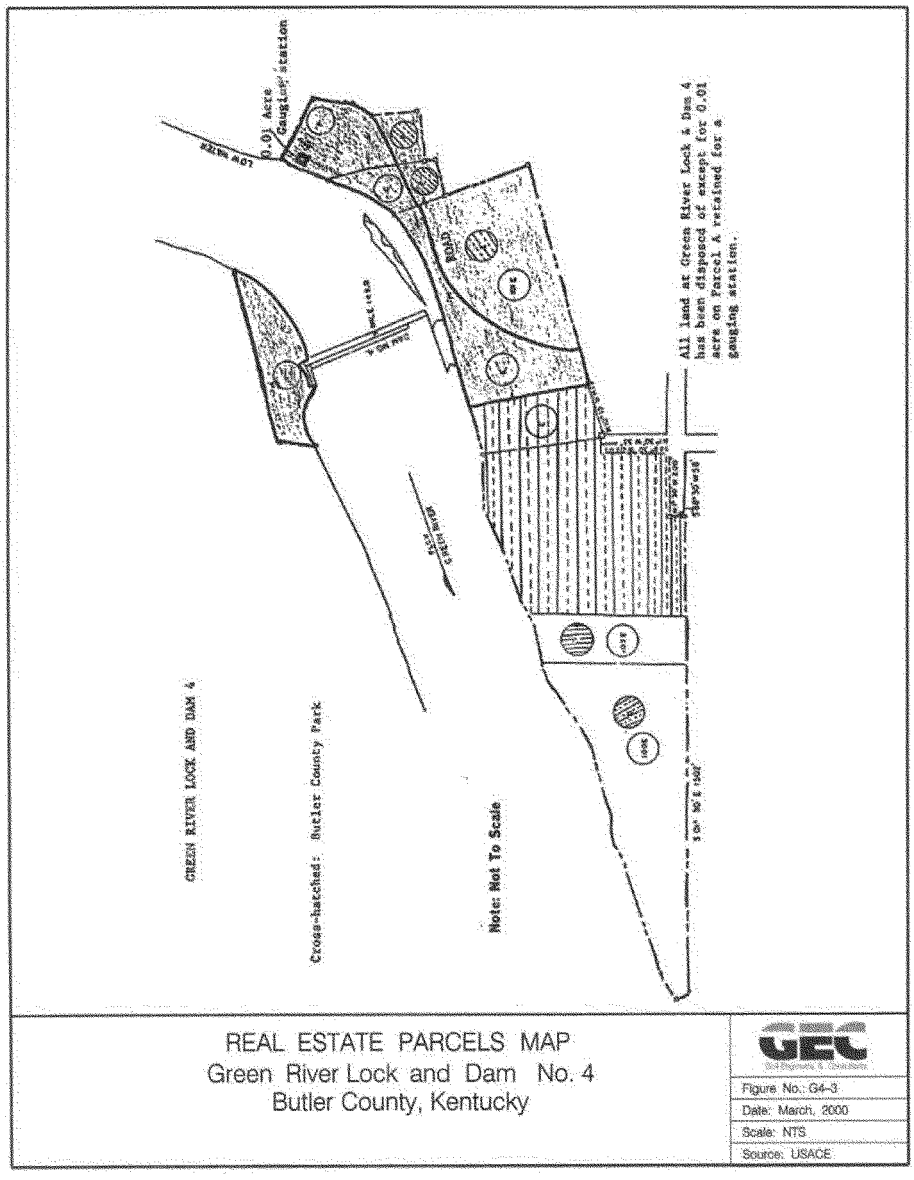
The United States retained 0.01 acre on Parcel A for the gauging station.

A 6.27-acre portion of Parcel D was conveyed to Harrry Barrett by quitclaim deed dated April 9, 1955. An easement for a right-of-way (not to exceed a width of 16 feet) extending over the government reservation and along the west boundary from the existing street was also granted. The United States reserved a perpetual flowage easement over the entire 6.27 acres.

A 1.89-acre portion of Parcel D was conveyed to N. B. Hudson by quitclaim deed dated December 20, 1973. The deed also granted an easement for a right-of-way (not to exceed a width of 16 feet) for joint and concurrent use with others over the government reservation and along the west boundary from the existing street. No reservations to the United States were included in the quitclaim deed.

A 8.59-acre portion of Parcels D and E was conveyed to Butler County, Kentucky for use as a public park and recreation by quitclaim deed dated January 10, 1975, recorded January 13, 1975, in

Figure G4-3. Real Estate Parcels Map



deed book 93, page 619 in the records of Butler County. Conveyance was subject to a perpetual easement for right-of-way extending along the west boundary from the north end of an unnamed street on the north end of the town of Woodbury, Kentucky, to a 6.27-acre tract conveyed to Harry Barrett by the Department of the Army. The United States reserved all mineral interests. The deed provided that title shall revert to the United States if needed for national defense purposes.

A 4.73-acre tract consisting of portions from Parcels C and E and all of Parcel B was conveyed to Euda C. and Coweta House quitclaim deed dated March 20, 1958, recorded April 7, 1958, in deed book 72, page 462 in the records of Butler County. The United States reserved a perpetual easement for ingress and egress.

The United States currently owns 0.01 acre in fee simple, 11.53 acres of perpetual flowage easement, 9.99 acres of right-of-way, and the mineral interests on 13.85 acres.

There are no outgrants associated with the property.

3.5 Current Use of the Property

The 0.01-acre tract is occupied by a USGS gauging station and the Corps is considering disposing of federal interest in the property. There are no Corps employees or contractors at the site.

3.6 Adjoining Property

Adjacent land use consists of the former lock and dam site and pastureland.

Based on G.E.C.'s review of quadrangle maps, aerial photographs, and land title records, land-use in the vicinity of G4 appears little changed over the last 46 years. A portion of the 1954 quadrangle is presented in Figure G4-4.

4.0 RECORDS REVIEW

A search of federal, state, and local government environmental databases was conducted in order to obtain and review records and documents that would aid in identifying known or potential environmental concerns at, or in the vicinity of, G4. ASTM E1527-97 provides a list of records that should be reviewed and the minimum search distances to use. AR 200-1 requires a search of Department of the Army records.

4.1 Sites Identified During Records Review

Table G4-1 presents a summary of the sites found in each database during the records review.

Figure G4-4. Historic Topographic Map.

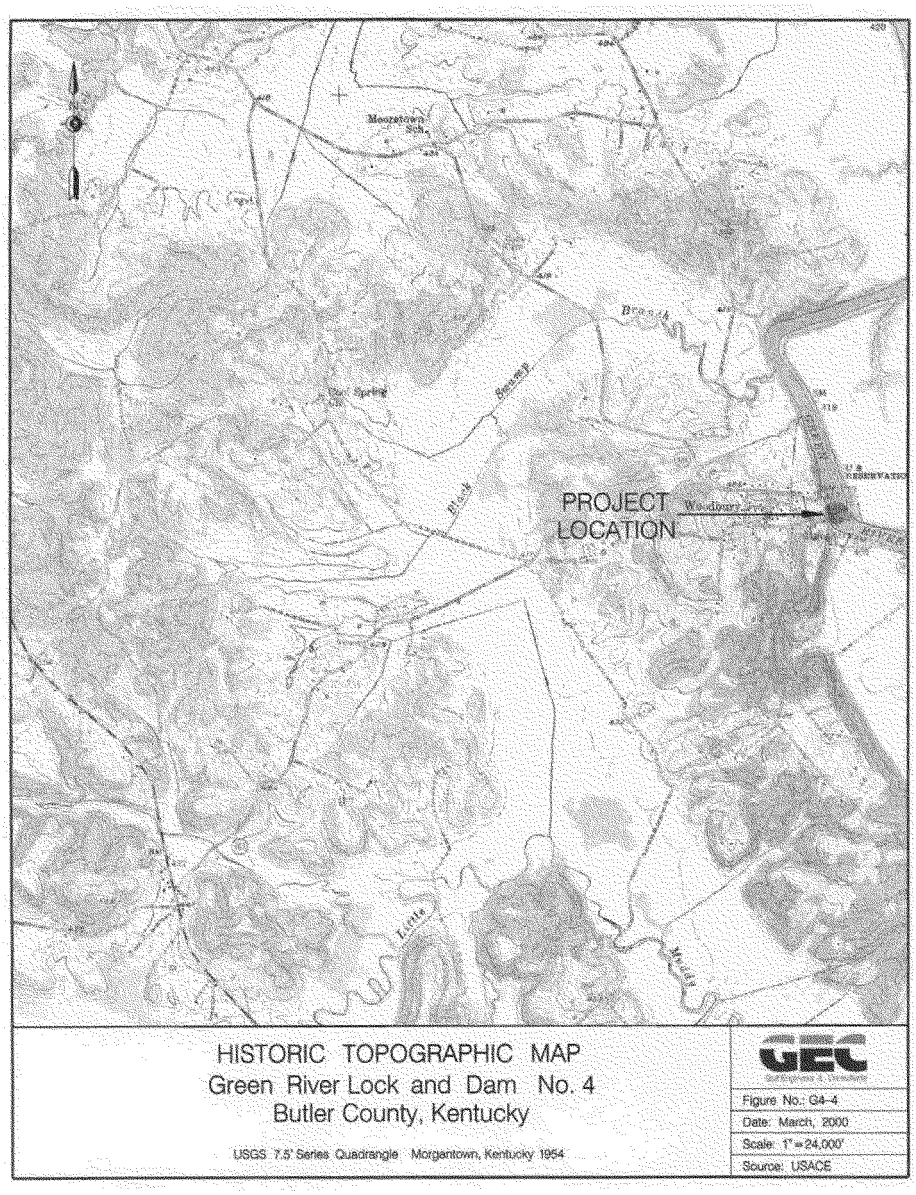


Table G4-1. Federal and State Database Review Summary

Database	< 0.13 Mile	0.13-0.25 Mile	0.25-0.50 Mile	0.50-1.0 Mile	Total
NPL	0	0	0	0	0
RCRIS-CA	0	0	0	0	0
RCRIS-TSD	0	0	0	-	0
CERCLIS	0	0	0	-	0
CERCLIS (S)	0	0	0	-	0
SWLF	0	0	0	-	0
WELLS	0	0	0	-	0
VIOLATERS	0	0	-	-	0
TRIS	0	0	-	-	0
UST/AST	0	0	-	-	0
ERNS	0	-	-	-	0
GNRTR	0	-	-	-	0

Source: G.E.C., February 2000. (-) Outside ASTM-recommended search radius.

The database review resulted in no plottable sites within the ASTM E1527-97 recommended minimum search distance and six unplottable sites. Unplottable sites are those with insufficient location information such that they can only be identified as being within the same zip code as G4. G.E.C. made every effort to locate these sites and assess their relevance to the project. Of the six sites, three are UST/AST sites. The remaining three are solid waste landfill facilities.

5.0 FINDINGS

5.1 Hazardous Substances

This section applies to the storage, handling, transportation, and disposal of substances deemed hazardous under the Resource Conservation Recovery Act (RCRA) at G4.

No evidence of such activity at the site, such as stained soil or distressed vegetation, was noted during the field investigation nor discovered in the process of the federal and state database review.

5.2 Polychlorinated Biphenyls

There are no pole-mounted electrical transformers located at the site, and it is G.E.C.'s opinion that no hazard is posed.

5.3 Petroleum Products / Petroleum Derivatives

G.E.C. could find no information in the course of the records review or field investigation that petroleum products and/or derivatives were stored at the gauging station or that a release of such materials ever occurred. Accordingly, it is G.E.C.'s opinion that there are no hazards.

5.4 Lead

Chipped, cracked, and flaked paint was observed on the door of the gauging station. Should the paint contain lead, conditions could pose a hazard to human health. Disturbance or removal of the structure would have to be conducted in accordance with state and local regulations.

5.5 Asbestos

There appear to be no asbestos concerns at the property.

5.6 Air Quality

There are no apparent air quality issues associated with the property.

5.7 Public Safety

The gauging station is not secured from public access and does present a potential fall hazard.

5.8 Potential Sites of Concern

G.E.C. was able to locate the three UST/AST sites and they are well outside the ASTM-recommended search distance.

G.E.C. was unable to locate the three solid waste landfill facilities, however they were not observed to be in the vicinity of the site.

It is G.E.C.s opinion that none of the six unplottable sites are likely to have had any impact on environmental conditions at G4.

5.9 Federal and State Agency Evaluations

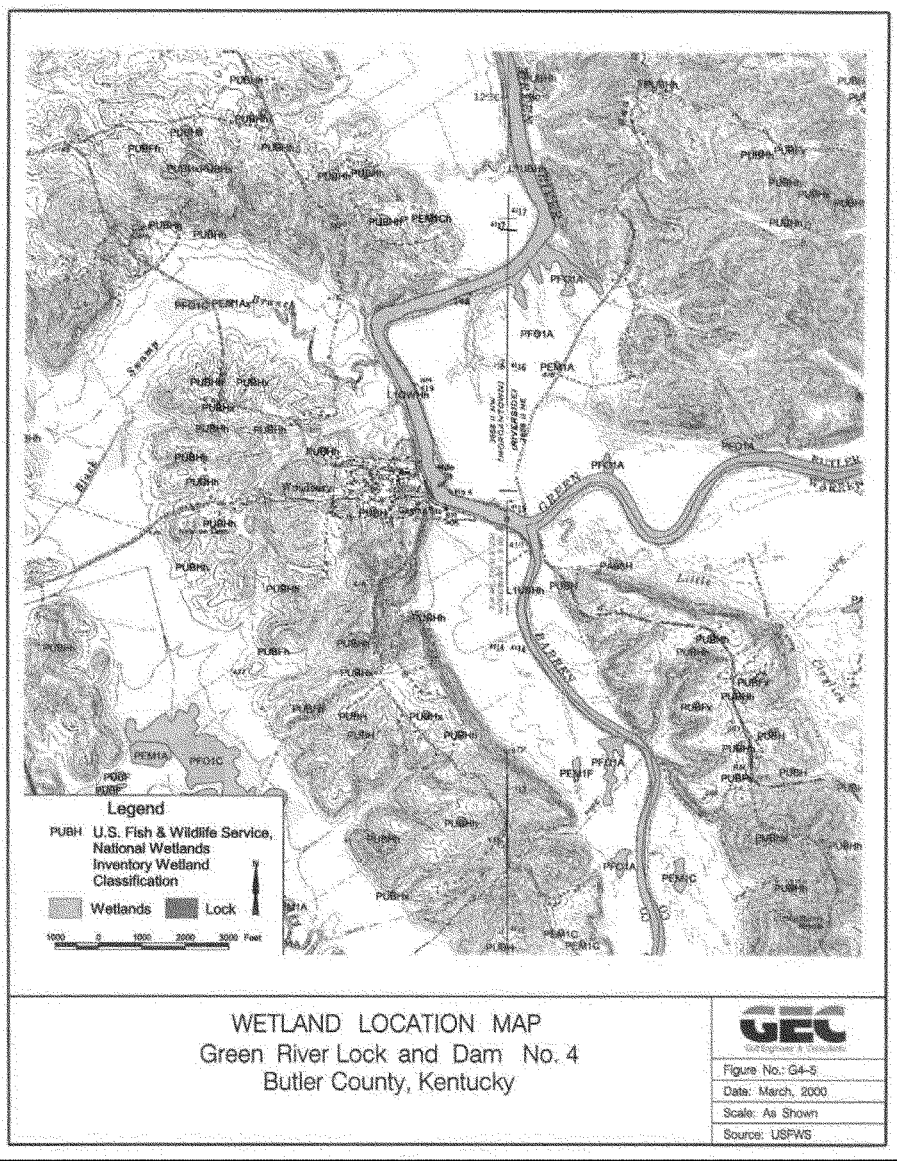
5.9.1 Wetlands

A Department of the Interior National Wetlands Inventory Map dated 1988, a portion of which is presented in Figure G4-5, indicates that there are no wetlands on the property. G.E.C.'s survey of the site during the field investigation confirmed this.

5.9.2 Cultural Resources

A Phase I Cultural Resources Reconnaissance was performed in 1998 for the site to determine if any archaeological resources would be impacted by federal disposal of the property. The reconnaissance found no evidence of prehistoric or undisturbed historic era cultural remains. Efforts are currently underway to document the existing structures at the facility. To date, the District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. The District expects that the facility will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

Figure G4-5


Legend
PUBH U.S. Fish & Wildlife Service, National Wetlands Inventory Wetland Classification
Wetlands
Lock
1000 0 1000 2000 3000 Feet
WETLAND LOCATION MAP
Green River Lock and Dam No. 4
Butler County, Kentucky
GEC
Figure No.: G4-5
Date: March, 2000
Scale: As Shown
Sources: USFWS

5.9.3 Threatened and Endangered Species

Threatened and endangered species occur in the Green and Barren rivers and on adjacent terrestrial habitat. The federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system, portions of which are located within the pool created by G6, and the U.S. Fish and Wildlife Service (USFWS) has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the species.

Caves in the study area also provide habitat for the federally endangered gray bat and Indiana bat, which use the caves as hibernacula. One cave within the study area is known to support a gray bat maternity colony, and future surveys in additional caves may find other maternity colonies. Suitable habitat for Indiana bat maternity colonies also exists throughout the project area, and additional studies may confirm their presence.

The study project area also contains habitat for a variety of federally listed species of birds. Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range. The Federally endangered American peregrine falcon (*Falco peregrinus anatum*) also occurs as a migrant or transient in the study area.

Endangered freshwater mussels in the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket pearly mussel (*Lampsilis abrupta*), and the fanshell (*Cyprogenia stegaria*). Recently deceased specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have also been observed, indicating their presence in the project area as well. Other listed mussel species that might still occur in the project area include the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Edpioblasma sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussels still reproduce in the Green River, and it is thought that this is one of the few, perhaps the only, rivers where this occurs.

Federally threatened plants found in the study area include Price's potato bean (*Apios priceana*) and Eggert's sunflower (*Helianthus eggertii*).

Rare species for which potential habitat exists in the project area include the southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*Myotis leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*),

eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender, Kirtland's water snake (*Clonophis kirtlandi*), cooperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), spectacle case pearly mussel (*Cumberlandia monodonta*), Kentucky creekshell mussel (*Villosa ortnanni*), rabbit's foot pearly mussel (*Quadrula cylindrica*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). These species are not currently considered candidate species, however, they could be listed in the future if their numbers decline and threats to their survival persist.

6.0 SUMMARY AND CONCLUSION

G4 is located at Woodbury, Butler County, Kentucky, 149.0 miles above the mouth of the Green River. Government-owned property at the site consists of the lock and lock walls, and a USGS gauging station on a 0.01-acre tract located on the left descending (west) bank.

The Corps is considering disposing of the federal interest in the property due to a lack of any continued authorized project purpose, and G.E.C. was contracted to conduct an EBS in order to facilitate the possible disposal. In accordance with applicable requirements contained in AR 200-1 and ASTM E1527-97, G.E.C. reviewed Department of the Army records and federal, state, and local databases, federal and state agency evaluations, conducted historical research of the site and surrounding area, interviewed pertinent personnel, and performed a site investigation in order to characterize environmental conditions at the site.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at the site.

There is no evidence suggesting the presence of PCBs at the site.

There is no evidence that the site ever stored significant amounts of petroleum products and/or derivatives or that a release of such materials ever occurred.

Chipped, cracked, and flaked paint was observed on the door of the gauging station. Should the paint contain lead, conditions could pose a hazard to human health.

There appear to be no asbestos or air quality concerns at the site.

The gauging station presents a fall hazard and there may be liability associated with its ownership.

Six unplottable potential sites of concern were found during the federal and state database review. G.E.C. located three of the six and they are well outside of the ASTM-recommended search

distances. There is reason to believe the remaining three sites are also located well away from the site. In any event, it is unlikely that any of the six sites has had an impact on conditions at G4.

No wetlands are located at the site, but threatened and endangered species are known to occur in the vicinity.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of the site, however the improvements at G4 may themselves be potentially eligible for listing in the National Register of Historic Places.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, Green River Lock and Dam No. 4 is a Category 1 site, an area where no release or disposal of hazardous substances or petroleum products has occurred, and no migration of these substances from adjacent areas has occurred.

Section G5

GREEN RIVER LOCK AND DAM NO. 5

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1.0 INTRODUCTION

G5 is located near Glenmore, in Butler and Warren counties, Kentucky, 168.1 miles above the mouth of the Green River. The site occupies approximately 27.064 acres on the right descending bank (north bank, Butler County), and 5.21 acres located on the left descending bank (south bank, Warren County). Improvements at the site include the lock and dam, the remains of an earlier lock, an operations building, and a spring house, all on the right descending bank. The original lock was put into operation on January 17, 1900 and taken out of service in 1934. The current lock and dam were built in 1933-1934 with operations commencing on December 22, 1934. The structure was deactivated on August 31, 1951.

The Corps is considering disposing of the federal interest in G5 due to a lack of any continued authorized project purpose. The purpose of this EBS is to characterize the environmental baseline condition of the property in order to facilitate the possible disposal and to identify any potential environmental impacts posed by a transfer of the property from Corps ownership.

2.0 METHODOLOGY

2.1 Federal, State, and Local Records

The Vista report for this project is presented in Appendix G5-A.

2.2 Site Investigation

G.E.C. personnel conducted a thorough investigation of the property on January 25, 2000. An EBS checklist completed during the investigation is presented in Appendix B1-B. Photographs taken during the investigation are presented in Appendix B1-C.

2.3 Historical Use Information

For this project G.E.C. reviewed maps dating back to 1954. Maps reviewed:

7.5' Reedyville, Kentucky	1954
7.5' Reedyville, Kentucky	1954, Photo-inspected 1979

3.0 SITE DESCRIPTION

3.1 Location

G5 is located near Glenmore, in Butler and Warren counties, Kentucky, 168.1 miles above the mouth of the Green River. The site is accessed via Kentucky highways 185 and 67. A site location map is presented in Figure G5-1 and an aerial photograph is presented in Figure G5-2.

3.2 Site and Vicinity Characteristics

The 27.064-acre site on the right descending bank is accessed by taking Lock No. 5 Road north from Kentucky Highway 185. The site consists primarily of a terrace comprised of brush and woods at the base of a steep, wooded hillside.

Figure G5-1. Site Location Map.

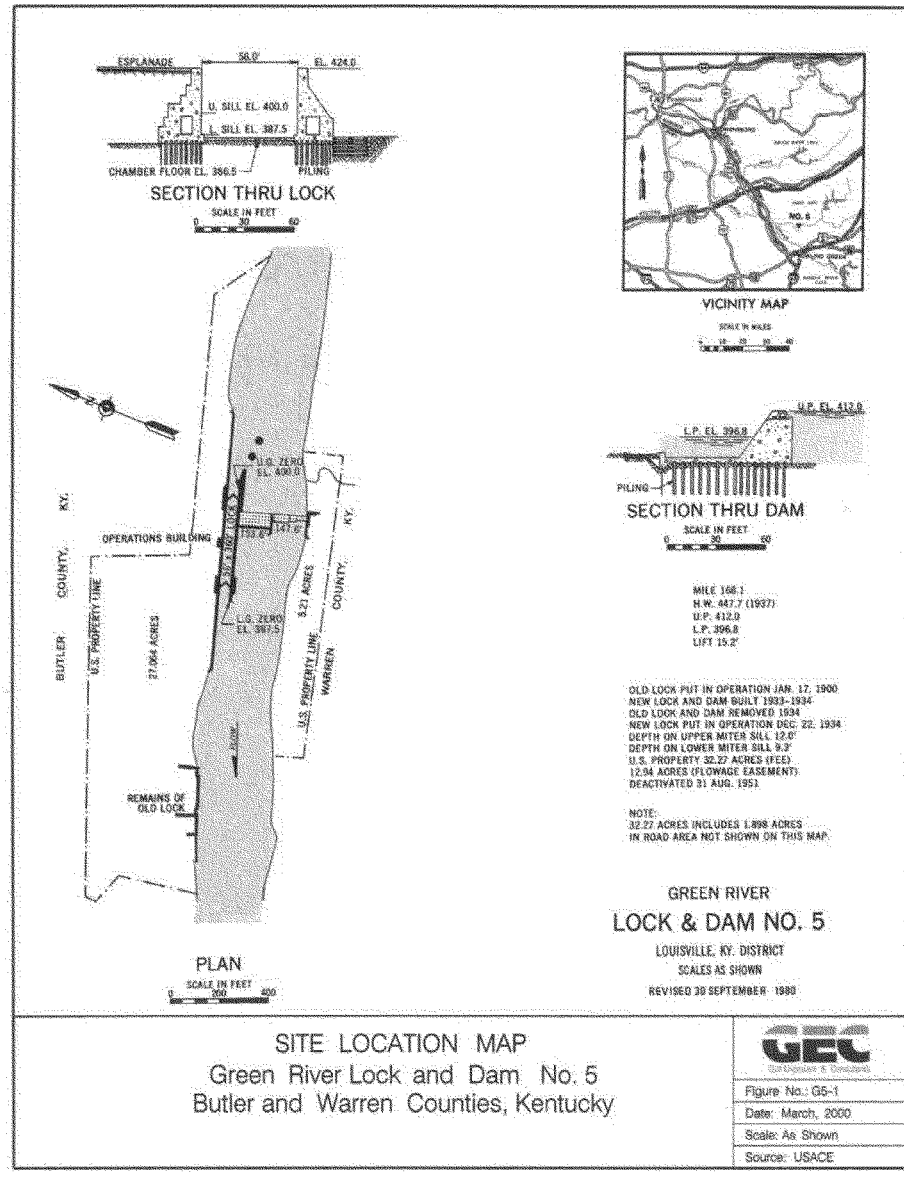
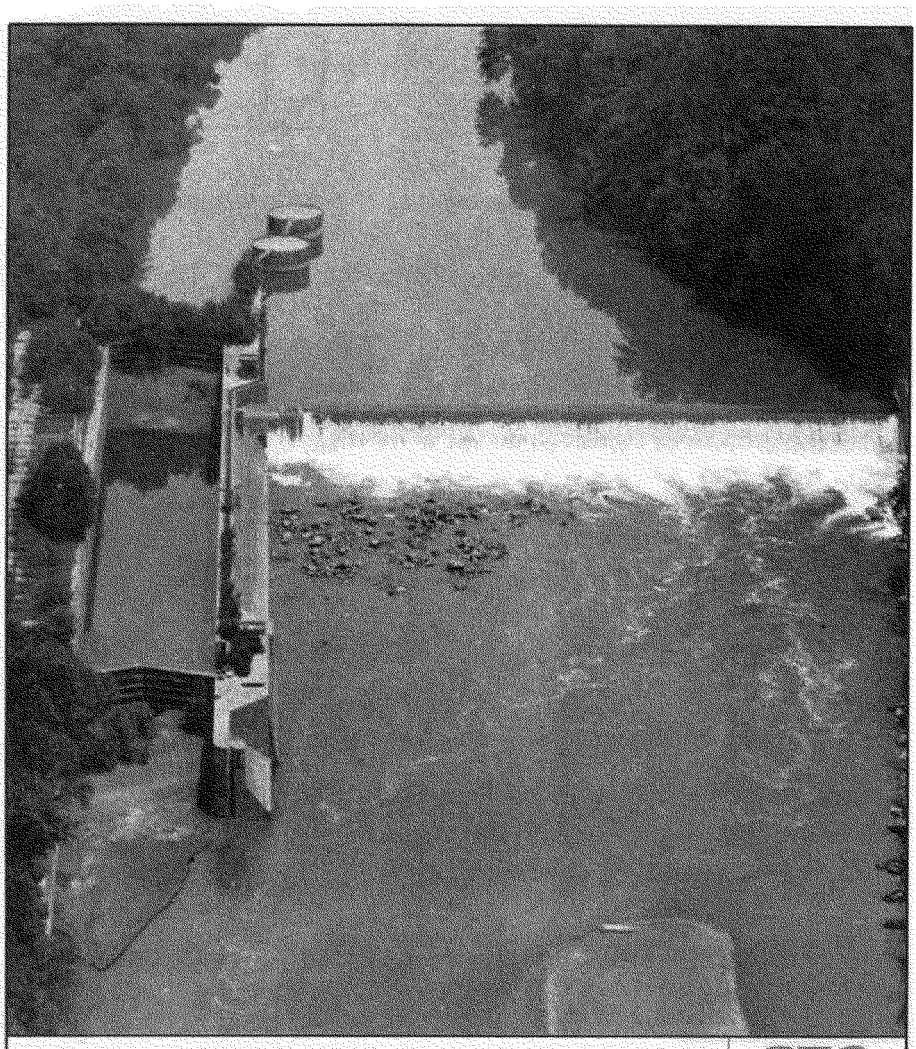


Figure G5-2. Aerial Photograph



AERIAL PHOTOGRAPH
Green River Lock and Dam No. 5
Butler and Warren Counties, Kentucky

GEC
Engineers & Designers

Figure No.: G5-2
Date: March, 2000
Scale: N/A
Source: USACE

The 5.21-acre site on the left descending bank is accessed by taking an unnamed improved gravel road north from Kentucky Highway 67. The site was apparently heavily wooded but has recently been timbered. The topography transitions from steep hillside to level terrace.

G5 was constructed at the turn of the century to provide slack water navigation on the Green River. The original lock was put into operation on January 17, 1900, and taken out of service in 1934. The current lock and dam were built in 1933-1934, with operations commencing on December 22, 1934. The structure was deactivated on August 31, 1951. Improvements at the site include the lock and dam, the remains of an earlier lock, an operations building, and a spring house, all on the right descending bank. There are no minerals of any value at the site.

Elevation at the property is 430-435 feet, and storm water runoff flows across the property into the Green River.

3.3 Structures, Roads, and Other Improvements

Both tracts are fenced but neither is gated.

Overhead electrical service transits the 27.064-acre tract, however no electrical transformers are present. No utilities were observed at the 5.21-acre tract.

The facility originally contained several improvements, including residences, a barn, and field office, all on the right descending bank. None of the structures remain, however old sidewalks, a stairway, two earth-filled cisterns, and the remains of three foundations were observed during the site inspection.

The only remaining improvements at the site include the lock and dam, the remains of an earlier lock, an operations building, and a spring house. The lock is 56 feet wide and 360 feet long, and the dam is a fixed-type. Upper pool elevation is 412.0 feet and lower pool elevation is 396.8 feet.

3.4 Past Use of the Property

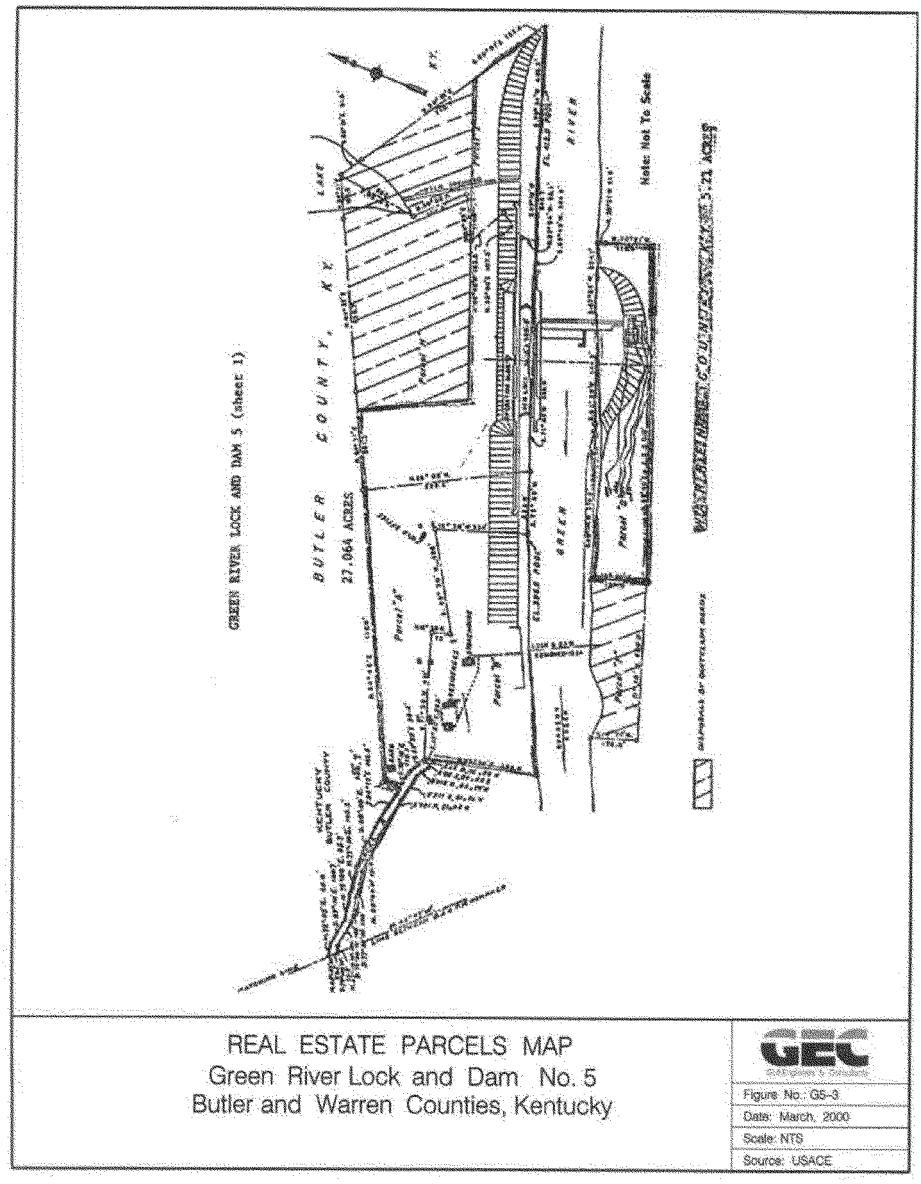
Figure G5-3 presents locations of the parcels described in this section. Parcel A, 6.70 acres, was acquired from D. J. Honaker, et al. by deed dated January 3, 1902, recorded March 24, 1902, in deed book 10, page 510 in the records of Butler County.

Parcel B, 7.276 acres, was acquired from D. J. Honaker, et al. by deed dated October 16, 1895, recorded in deed book 7, page 304 in the records of Butler County.

Parcel C, 1.298 acres, was acquired for road access from P. M. Honaker by deed dated October 16, 1895, recorded in deed book 7, page 302 in the records of Butler County.

Parcel D, 0.55 acres, was acquired from P. M. Honaker by deed dated December 4, 1903, recorded in deed book 14, page 216, in the records of Butler County.

Figure G5-3. Real Estate Parcels Map



Parcel E, 0.05 acres, was acquired from John Stephens, et al. by deed dated December 4, 1903, recorded in deed book 14, page 218, in the records of Butler County.

Parcel F, 2.45 acres in Warren County, Kentucky, was acquired by declaration of taking.

Parcel G, 5.21 acres, was acquired from R. H. Runner, et al. by deed dated December 7, 1933, recorded March 17, 1934, in deed book 173, page 311, in the records of Warren County.

Parcel H, 14.82 acres, was acquired from Ethel Honaker, et al. by deed dated January 11, 1934, recorded March 3, 1934, in deed book 43, page 280, in the records of Butler County.

Parcel I, 6.86 acres, was acquired from Lizzie G. Hays, et al. by deed dated August 18, 1933, recorded September 9, 1933, in deed book 43, page 134, in the records of Butler County.

The original G5 was removed and replaced with new structures in 1934. The new lock and dam was not rebuilt to handle the large Ohio River towboats but it was enlarged to dimensions of 56 feet by 360 feet. It was also reconstructed of concrete masonry and the dam was provided with a movable a-frame crest.

The structure was deactivated on August 31, 1951.

All of Parcel F, consisting of 2.45 acres, was conveyed to J. D. Spalding by quitclaim deed dated April 9, 1955. The United States reserved a perpetual flowage easement and right-of-way for all government owned roads and utilities.

Portions of Parcels H and I consisting of 10.49 acres were conveyed to E. E. Hays by quitclaim deed dated April 9, 1955. A 30-foot right-of-way easement was also granted, extending across the United States government reservation from the existing road at the northwest corner thereof. The right-of-way was forfeited due to nonuse or abandonment for a period of two consecutive years. The United States reserved a perpetual flowage easement and right-of-way for all government-owned roads and utilities.

There are no outgrants associated with the property.

3.5 Current Use of the Property

G5 is currently deactivated and considered excess to the needs of the U.S. Government. The Corps is considering disposing of the federal interest in the facility due to a lack of any continued authorized project purpose. There are no Corps employees or contractors at the site.

The property on the right descending bank is an attractive nuisance and is used for illegal dumping. Household trash was observed throughout the property, and the operations building has been vandalized.

The 5.21-acre tract has recently been timbered, and there was also evidence of illegal dumping at the property.

The highest and best use of the 25.164 acres (27.064 acres less the 1.90-acre road) in Butler County is considered to be recreational, with timber as a secondary use. The highest and best use of the 1.90-acre roadway is considered to be continued use as a road. An appraisal of the property has estimated the value of the 25.164 acres at $14,000. A value of $1 has been assigned to each of the easements.

The highest and best use of the 5.21 acres in Warren County is considered to be timber with a secondary use of recreational. An appraisal of the property has estimated the value of the 5.21 acres at $3,500. A value of $1 has been assigned to each of the easements.

3.6 Adjoining Property

Land adjacent to the 27.064-acre tract consists of woodland and pasture. A large residential subdivision is also in development, north of the property.

Land adjacent to the 5.21-acre tract consists of pasture and a few residential sites.

Based on G.E.C.'s review of quadrangle maps, aerial photographs, and land title records, land-use in the vicinity of G5 appears little changed over the last 46 years. A portion of the 1954 quadrangle is presented in Figure G5-4.

4.0 RECORDS REVIEW

A search of federal, state, and local government environmental databases was conducted in order to obtain and review records and documents that would aid in identifying known or potential environmental concerns at, or in the vicinity of, G5. ASTM E1527-97 provides a list of records that should be reviewed and the minimum search distances to use. AR 200-1 requires a search of Department of the Army Records.

4.1 Sites Identified During Records Review

Table G5-1 presents a summary of the sites found in each database during the records review. The database review resulted in no plottable sites within the ASTM E1527-97 recommended minimum search distance and 11 unplottable sites. Unplottable sites are those with insufficient location information such that they can only be identified as being within the same zip code as G5. G.E.C. made every effort to locate these sites and assess their relevance to the project.

Of the 11 sites, 5 are UST/AST sites. The remaining six are solid waste landfill facilities.

Figure G5-4. Historical Topographic Map

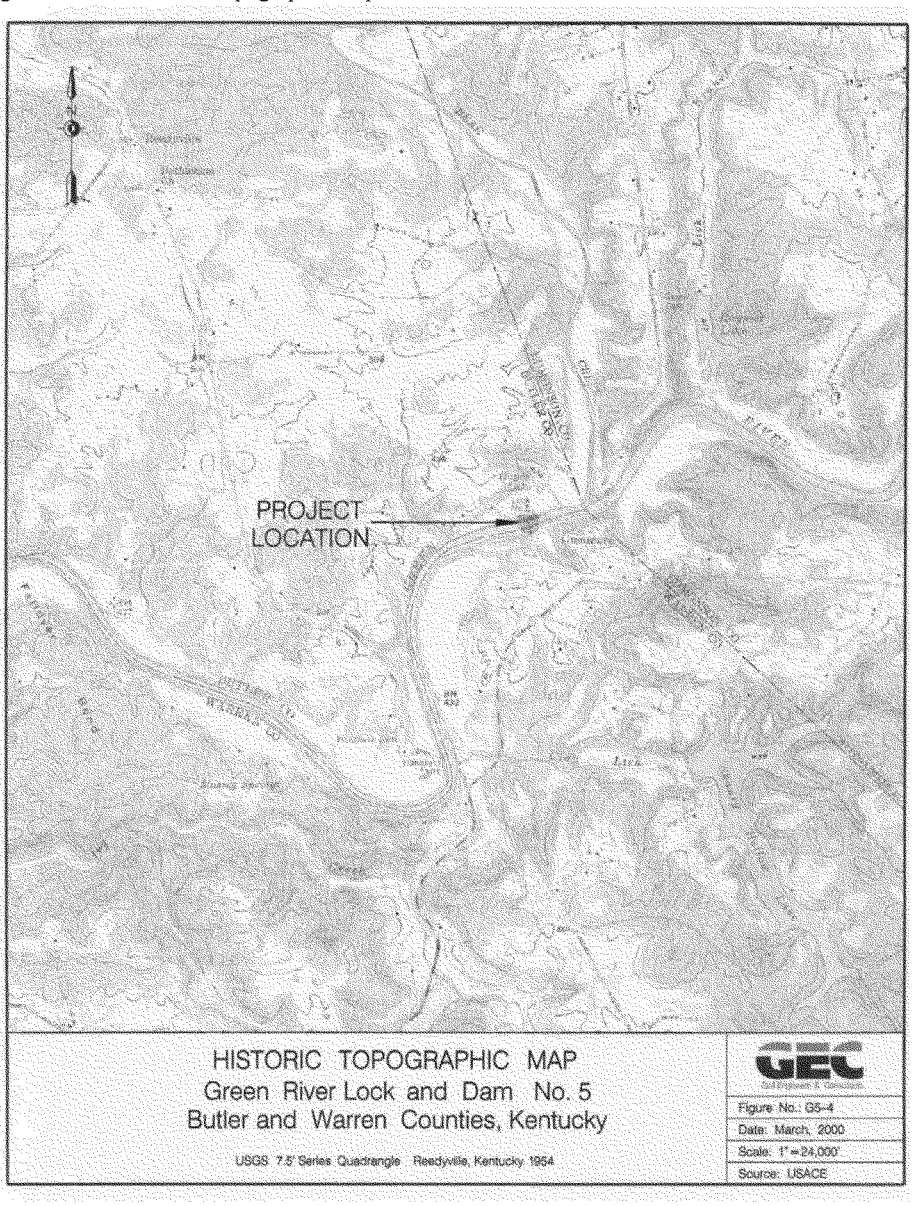


Table G5-1. Federal and State Database Review Summary

Database	< 0.13 Mile	0.13-0.25 Mile	0.25-0.50 Mile	0.50-1.0 Mile	Total
NPL	0	0	0	0	0
RCRIS-CA	0	0	0	0	0
RCRIS-TSD	0	0	0	-	0
CERCLIS	0	0	0	-	0
CERCLIS (S)	0	0	0	-	0
SWLF	0	0	0	-	0
WELLS	0	0	0	-	0
VIOLATERS	0	0	-	-	0
TRIS	0	0	-	-	0
UST/AST	0	0	-	-	0
ERNS	0	-	-	-	0
GNRTR	0	-	-	-	0

Source: G.E.C., February 2000. (-) Outside ASTM-recommended search radius.

5.0 FINDINGS

5.1 Hazardous Substances

This section applies to the storage, handling, transportation, and disposal of substances deemed hazardous under the Resource Conservation Recovery Act (RCRA) at G5.

No evidence of such activity at the site, such as stained soil or distressed vegetation, was noted during the field investigation nor discovered in the process of the federal and state database review.

5.2 Polychlorinated Biphenyls

There are no pole-mounted electrical transformers located at the site and electrical utilities have been disconnected from the operations building, however hydraulic oil released to the environment (Section 5.3) has the potential to contain PCBs. If the structure is removed, analytical investigations of soils under the structure could be warranted.

5.3 Petroleum Products / Petroleum Derivatives

During the field investigation G.E.C. observed hydraulic oil stains in the operations building and at several locations in the lock chamber. The stains are a result of vandalism to the hydraulic piping system, and hydraulic oil has been released to the environment.

G.E.C. found no other evidence or information that the facility ever stored significant amounts of other petroleum products and/or derivatives or that releases of such material occurred.

It is G.E.C.'s opinion any hazard to human health or the environment posed by the hydraulic oil releases is low.

5.4 Lead

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the door of the operations building. Should the paint contain lead, conditions at G5 could pose a hazard to human health. Disturbance of or removal of the structures would have to be conducted in accordance with state and local regulations.

5.5 Asbestos

There appear to be no asbestos concerns at the property.

5.6 Air Quality

There are no apparent air quality issues associated with the property.

5.7 Public Safety

The lock walls and dam, which are concrete, appeared to be in satisfactory condition. Some minor weathering and spalling of surficial concrete was observed, as were cracks, but the lock walls do not show evidence of settlement or movement. However, due to obvious falling/drowning hazards, and because the site is not secure from public access, there may be liability associated with continued ownership of the site.

5.8 Potential Sites of Concern

G.E.C. was able to locate four of the five UST/AST sites and they are well outside the ASTM- recommended search radius. Although the remaining tank was not located, it was not observed anywhere in the vicinity of the site.

G.E.C. was unable to locate any of the six solid waste landfill facilities, however they were not observed in the vicinity of the site.

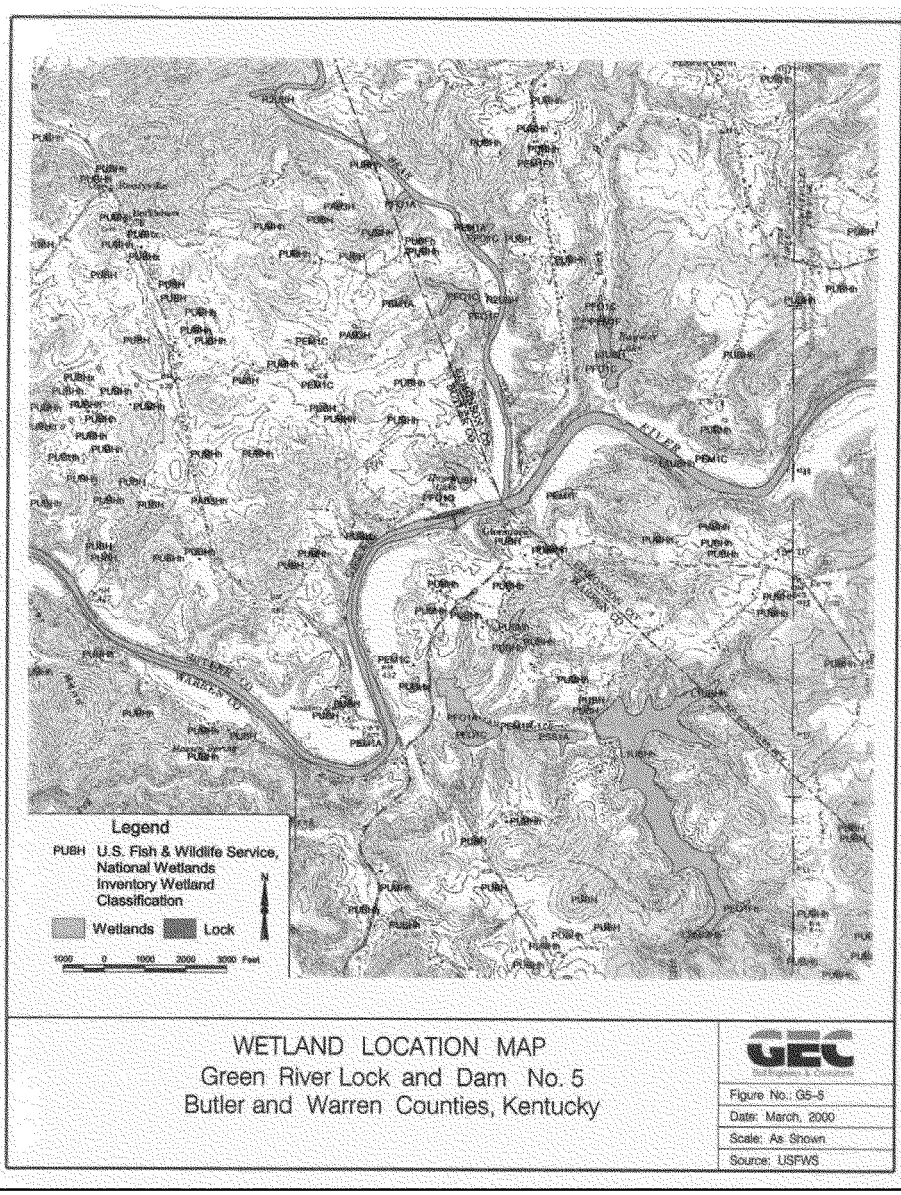
Accordingly, it is G.E.C.s opinion that none of the 11 unplottable sites are likely to have had an impact on environmental conditions at G5.

5.9 Federal and State Agency Evaluations

5.9.1 Wetlands

A Department of the Interior National Wetlands Inventory Map dated 1988, a portion of which is presented in Figure G5-5, indicates a forested palustrian wetland at the site, in the form of narrow riparian zones adjacent to the river. G.E.C. confirmed this during the field investigation.

Figure G5-5. NWI Map



5.9.2 Cultural Resources

A Phase I Cultural Resources Reconnaissance was performed in 1998 for the site to determine if any archaeological resources would be impacted by federal disposal of the property. The reconnaissance found no evidence of prehistoric or undisturbed historic era cultural remains. Efforts are currently underway to document the existing structures at the facility. To date, the District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. The District expects that the facility will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

5.9.3 Threatened and Endangered Species

Threatened and endangered species occur in the Green and Barren rivers and on adjacent terrestrial habitat. The federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system, portions of which are located within the pool created by G6, and the U.S. Fish and Wildlife Service (USFWS) has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the species.

Caves in the study area also provide habitat for the federally endangered gray bat and Indiana bat, which use the caves as hibernacula. One cave within the study area is known to support a gray bat maternity colony, and future surveys in additional caves may find other maternity colonies. Suitable habitat for Indiana bat maternity colonies also exists throughout the project area, and additional studies may confirm their presence.

The study project area also contains habitat for a variety of federally listed species of birds. Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range. The Federally endangered American peregrine falcon (*Falco peregrinus anatum*) also occurs as a migrant or transient in the study area.

Endangered freshwater mussels in the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket pearly mussel (*Lampsilis abrupta*), and the fanshell (*Cyprogenia stegaria*). Recently deceased specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have also been observed, indicating their presence in the project area as well.

Other listed mussel species that might still occur in the project area include the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Edpioblasma sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussels still reproduce in the Green River, and it is thought that this one of the few, perhaps the only, rivers where this occurs.

Federally threatened plants found in the study area include Price's potato bean (*Apios priceana*) and Eggert's sunflower (*Helianthus eggertii*).

Rare species for which potential habitat exists in the project area include the southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*Myotis leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*), eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender, Kirtland's water snake (*Clonophis kirtlandi*), cooperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), spectacle case pearly mussel (*Cumberlandia monodonta*), Kentucky creekshell mussel (*Villosa ortnanni*), rabbit's foot pearly mussel (*Ouadrula cylindrica*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). These species are not currently considered candidate species, however, they could be listed in the future if their numbers decline and threats to their survival persist.

6.0 SUMMARY AND CONCLUSION

G5 is located near Glenmore, Kentucky, 168.1 miles above the mouth of the Green River. The site occupies approximately 27.064 acres in Butler County and 5.21 acres in Warren County. Improvements at the site include the lock and dam, the remains of an earlier lock, an operations building, and a spring house, all on the right descending bank. The original lock was put into operation on January 17, 1900 and taken out of service in 1934. The current lock and dam was built in 1933-1934 with operations commencing on December 22, 1934. The structure was deactivated on August 31, 1951.

The Corps is considering disposing of the federal interest in the facility due to a lack of any continued authorized project purpose, and G.E.C. was contracted to conduct an EBS in order to facilitate the possible disposal. In accordance with applicable requirements contained in AR 200-1 and ASTM E1527-97, G.E.C. reviewed Department of the Army records and federal, state, and local databases, federal and state agency evaluations, conducted historical research of the site and

surrounding area, interviewed pertinent personnel, and performed a site investigation in order to characterize environmental conditions at the site.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at the site.

There are no pole-mounted electrical transformers located at the site and electrical utilities have been disconnected from the operations building, however hydraulic oil released to the environment (Section 5.3) has the potential to contain PCBs. If the structure is removed, analytical investigations of soils under the structure could be warranted.

There is no evidence that the site ever stored significant amounts of petroleum products and/or derivatives, however G.E.C. observed hydraulic oil stains in the operations building and new lock chamber. The stains are a result of vandalism to hydraulic piping systems at the facility. Although hydraulic oil was released to the environment, it is G.E.C.'s opinion that any hazard posed to human health or the environment is low.

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the three remaining structures. Should the paint contain lead, conditions at G3 could pose a hazard to human health, and removal or disturbance of any of the fittings would have to be conducted in accordance with state and local regulations.

There appear to be no asbestos or air quality concerns at the site.

Due to obvious falling/drowning hazards, and because the site is not secure from public access, there may be liability associated with continued ownership of the site.

Eleven unplottable sites of potential concern were found during the federal and state database review. G.E.C. located four of the 11 and they are well outside of the ASTM-recommended search distance. There is reason to believe the remaining seven sites are also located well away from the site. In any event, it is unlikely that any of the 11 sites has had an impact on conditions at G5.

G.E.C. observed forested palustrian wetlands at the site, and threatened and endangered species are known to occur in the vicinity.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of the site, however the improvements at G5 may themselves be potentially eligible for listing in the National Register of Historic Places.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, G5 is a Category 2 site, an area where only release or disposal of petroleum products has occurred.

Section G6

GREEN RIVER LOCK AND DAM NO. 6

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1.0 INTRODUCTION

G6 is located just upstream of Brownsville, in Edmonson County, Kentucky, 181.7 miles above the mouth of the Green River. The site occupies approximately 18.0 acres on the right descending bank (west bank), and 0.83 acres located on the left descending bank (east bank). Improvements at the site include the lock and dam, a spring house located on the 0.83-acre tract, and a USGS gauging station located on the 18-acre tract, upstream of the lock. Operations commenced on January 1, 1906 and ceased on August 1, 1951. The structure was deactivated on August 31, 1951.

The Corps is considering disposing of the federal interest in G6 due to a lack of any continued authorized project purpose. The purpose of this EBS is to characterize the environmental baseline condition of the property in order to facilitate the possible disposal and to identify any potential environmental impacts posed by a transfer of the property from Corps ownership.

2.0 METHODOLOGY

2.1 Federal, State, and Local Records

The Vista report for this project is presented in Appendix G6-A.

2.2 Site Investigation

G.E.C. personnel conducted a thorough investigation of the property on January 25, 2000. An EBS checklist completed during the investigation is presented in Appendix G6-B. Photographs taken during the investigation are presented in Appendix G6-C.

2.3 Historical Use Information

For this project G.E.C. reviewed maps dating back to 1954. Maps reviewed:

7.5' Brownsville, Kentucky	1954
7.5' Brownsville, Kentucky	1965

3.0 SITE DESCRIPTION

3.1 Location

G6 is located just upstream of Brownsville, in Edmonson County, Kentucky, 181.7 miles above the mouth of the Green River. The site is accessed by Kentucky Highway 259. A site location map is presented in Figure G6-1 and a aerial photograph is presented in Figure G6-2.

3.2 Site and Vicinity Characteristics

The 18.0-acre site on the lock side is accessed by Edmonson County Road 183. The county road changes to gravel and dead-ends at the United States property line. The site consists primarily of a terrace at the base of a hillside. The riverbank is forested, and herbaceous vegetation and woody shrubs cover the terrace.

Figure G6-1. Site Location Map

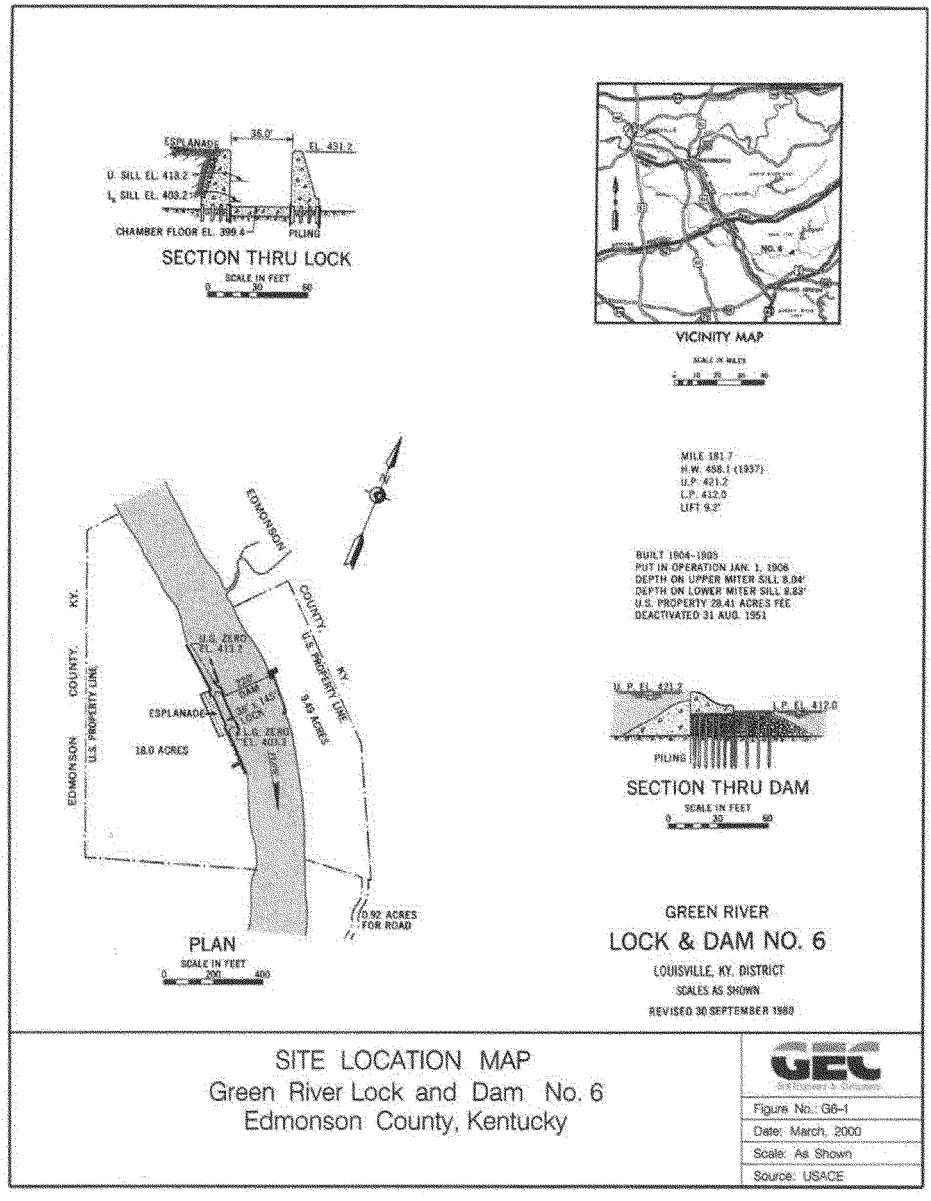
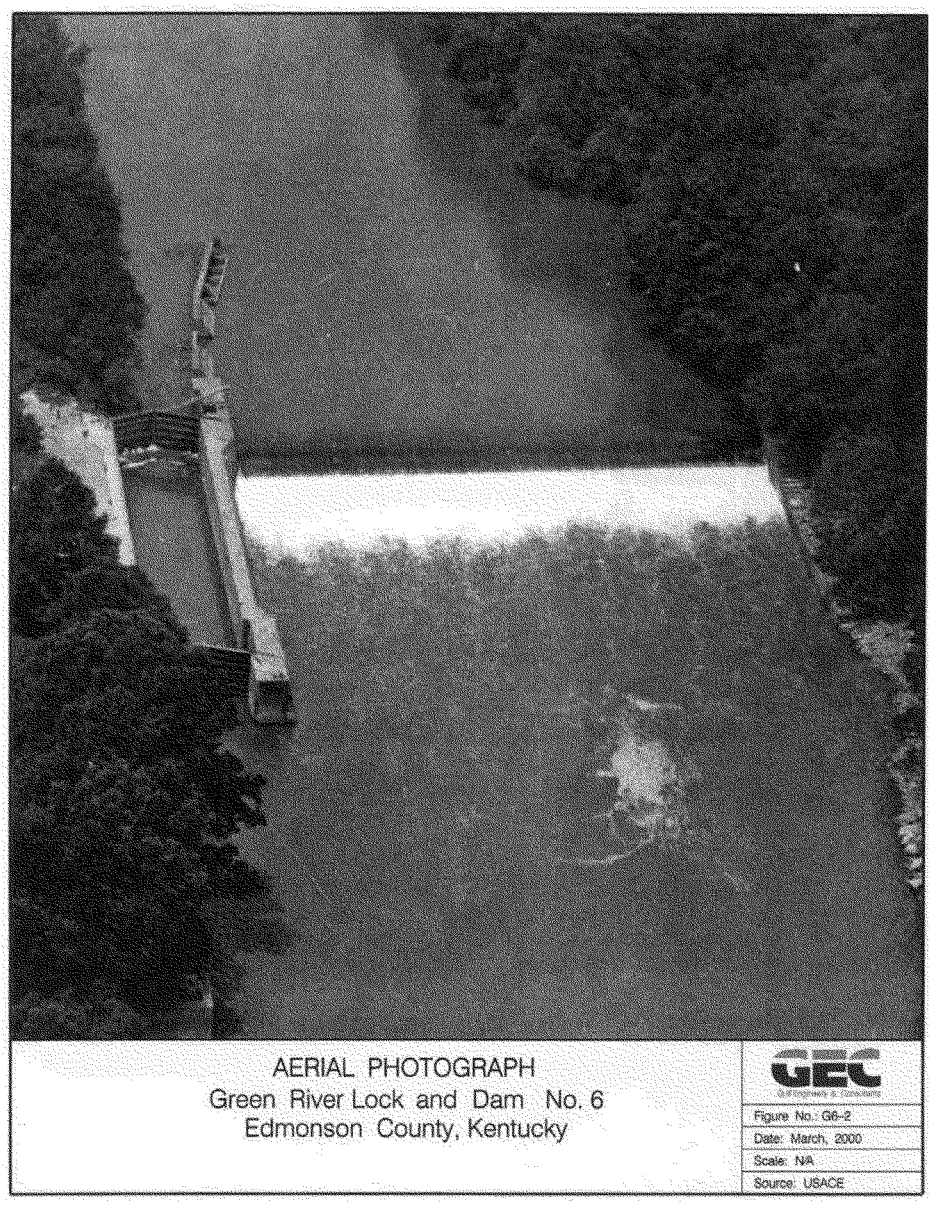


Figure G6-2. Aerial Photograph



The 0.83-acre site was originally part of a larger tract of which a large portion (6.22 acres), was transferred U.S. Department of the Interior, National Park Service. The site is heavily wooded with steep topography, and lies between the river and land belonging to Mammoth Cave National Park. It is accessed via Houchins Ferry Road and James Road from the east side of Brownsville. The final approach to the site via James Road is gated.

G6 was constructed at the turn of the century to provide slack water navigation on the Green River. Operations commenced on January 1, 1906 and ceased on August 1, 1951. The only remaining improvements at G6 are the lock and dam, spring house, and gauging station. There are no minerals of any value at the site.

Elevation at the property is 490 – 495 feet, and storm water runoff flows across the property into the Green River.

3.3 Structures, Roads, and Other Improvements

The 18-acre tract on the right descending bank is fenced on the north and west, but not on the south. The 0.83-acre site on the east side of the river is not fenced.

Utilities observed on the 18-acre tract include overhead electrical service and electrical transformer for the gauging station. An underground telephone line also appears to transit the site. No utilities were observed on the left descending bank.

The facility originally contained several improvements, including two dwellings, a well house, an office/tool house, two toilets, a garage/cold house, two barns, two chicken houses, and a spring house. None of the structures remain, however old sidewalks, a stairway, and remains of a foundation were observed during the site inspection.

The only improvements remaining are the lock, dam, spring house, and gauging station. The lock is 36 feet wide and 145 feet long, and the dam is a fixed-type. Upper pool elevation is 421.2 feet and lower pool elevation is 412.0 feet.

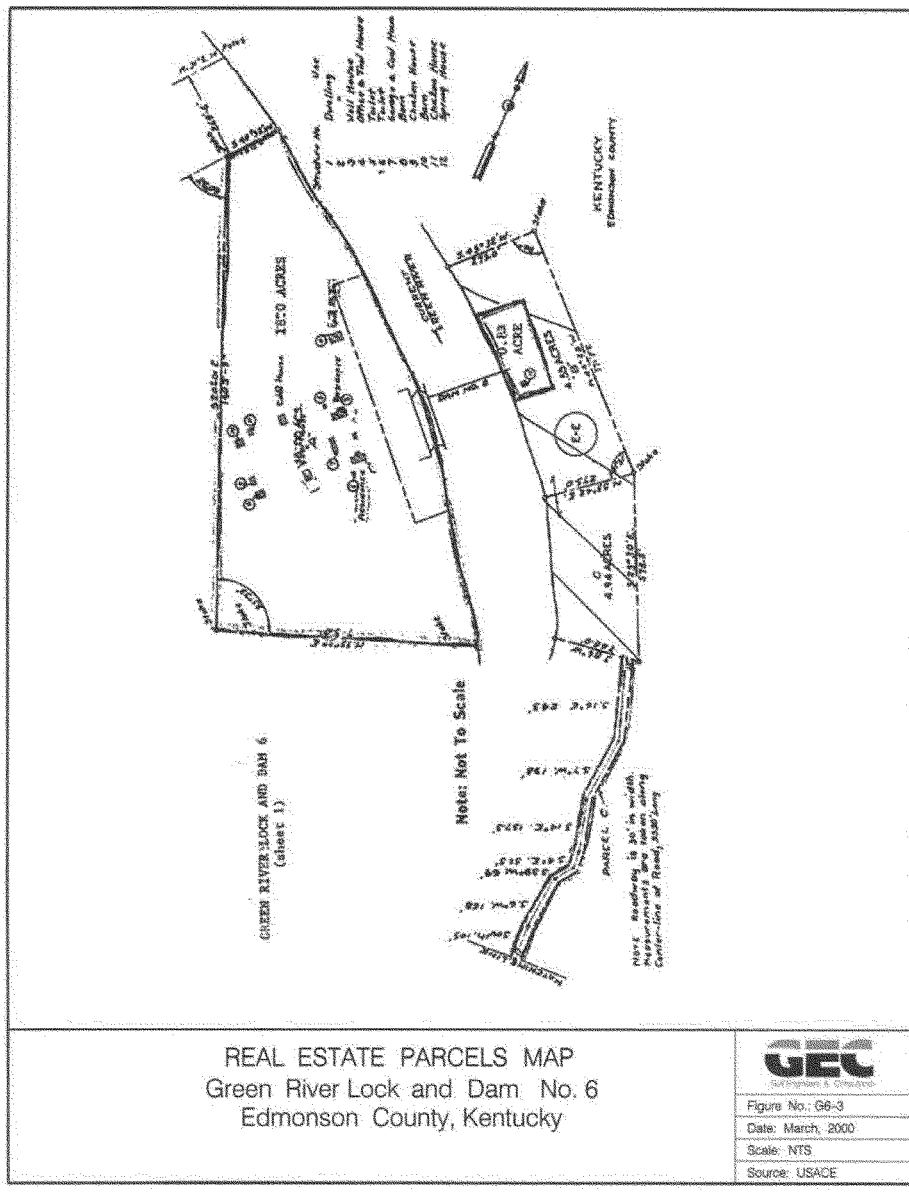
3.4 Past Use of the Property

Construction of G6 was authorized by the River and Harbor Act of July 13, 1902. It was built 1904-1905 put into operation on January 1, 1906.

Figure G6-3 presents locations of the parcels described in this section. Parcel A, 18.00 acres, was acquired from Jessee T. Alexander, et al. by deed dated January 11, 1904, recorded January 14, 1904, in deed book V, page 541 in the records of Edmonson County.

Parcel B, 4.55 acres, was acquired from Joseph G. Madison, et al. by deed dated March 9, 1903, recorded December 29, 1903, in deed book V, page 516 in the records of Edmonson County.

Figure G6-3. Real Estate Parcels Map



Parcel C, the 30-foot wide road on the abutment side of the Green River, was acquired from C. M. James, et al. by deed dated September 7, 1909, recorded November 10, 1909, in deed book 7, page 612 in the records of Edmonson County.

Parcel D was acquired for continuation of a the 30-foot wide road from A. D. Cook, et al. by deed dated September 7, 1909, recorded in deed book 7, page 607 in the records of Edmonson County.

Operations ceased at the Green River Lock and Dam No. 6, with the lock gates closed, on August 1, 1951. At the time, the Corps favored allowing the structure to remain in place, thereby preserving the pool, to provide recreational value. The structure was deactivated on August 31, 1951.

G6 deteriorated and in 1974-1975, the Corps poured concrete in order to stabilize the upstream lock gates. The structure continued to deteriorate and in July, 1988, increasing flows around and under the lock and dam were noticed. The Corps opened an invitation for bids to repair the structure that same year.

In 1989, repairs were made to the structure by placing a sheet pile cutoff upstream of the upper gates and into the right descending bank. The upper gates were also partially encased in concrete. This work was performed as the result of major seepage through the lock chamber, and end-around seepage occurring through the bank.

A 6.22-acre tract, comprised of most of Parcel B and a portion of Parcel C, was transferred on September 2, 1988, to the United States Department of the Interior, National Park Service. Approximately 0.83 acres of Parcel B, along with the right of egress and ingress over the 6.22 acres conveyed, was retained for maintenance of the dam.

There are no outgrants associated with the property.

3.5 Current Use of the Property

G6 is currently deactivated and considered excess to the needs of the U.S. Government. The Corps is considering disposing of the federal interest in the facility due to a lack of any continued authorized project purpose. There are no Corps employees or contractors at the site.

The property on the right descending bank is an attractive nuisance and is used for illegal dumping. Household trash, construction debris, tires, and various five-gallon containers were observed throughout the site. Additionally, there is an abandoned and decaying houseboat in the river, upstream of the upper pool approach wall, along the right descending bank. There was no evidence of dumping on the left descending bank, the area appears to be hunted extensively.

The highest and best use of the 18 acres lock side is considered to be recreational. In a few years timber may be a viable secondary use. An appraisal of the property has estimated the value at $17,000.

The highest and best use of the 0.83 acre and roadway on the abutment side of the lock and dam is considered to be recreational, as a part of the existing national park and roadway. An appraisal of the property has estimated the value of the 0.83 acre and the roadway at $1 each.

3.6 Adjoining Property

Land north of the 18-acre tract on the right descending bank has been recently been cleared, apparently for use as a home site.

An improved road is under construction along the west property line of the 18-acre tract to provide access to the home site.

Land south of the 18-acre tract on the right descending bank is used for pasture.

Land on all sides of the 0.83-acre tract is undeveloped, recreational hardwood forest.

Based on G.E.C.'s interviews and a review of quadrangle maps, aerial photographs, and land title records, land-use in the vicinity of G6 appears little changed over the last 46 years. A portion of the 1954 quadrangle is presented in Figure G6-4.

4.0 RECORDS REVIEW

A search of federal, state, and local government environmental databases was conducted in order to obtain and review records and documents that would aid in identifying known or potential environmental concerns at, or in the vicinity of, G6. ASTM E1527-97 provides a list of records that should be reviewed and the minimum search distances to use. AR 200-1 requires a search of Department of the Army records.

4.1 Sites Identified During Records Review

Table G6-1 presents a summary of the sites found in each database during the records review. The database review resulted in no plottable sites within the ASTM E1527-97 recommended minimum search distances and 21 unplottable sites. Unplottable sites are those with insufficient location information such that they can only be identified as being within the same zip code as G6. G.E.C. made every effort to locate these sites and assess their relevance to the project.

Of the 21 sites, 18 are UST/AST sites. The remaining three are solid waste landfill facilities.

Figure G6-4. Historic Topographic Map

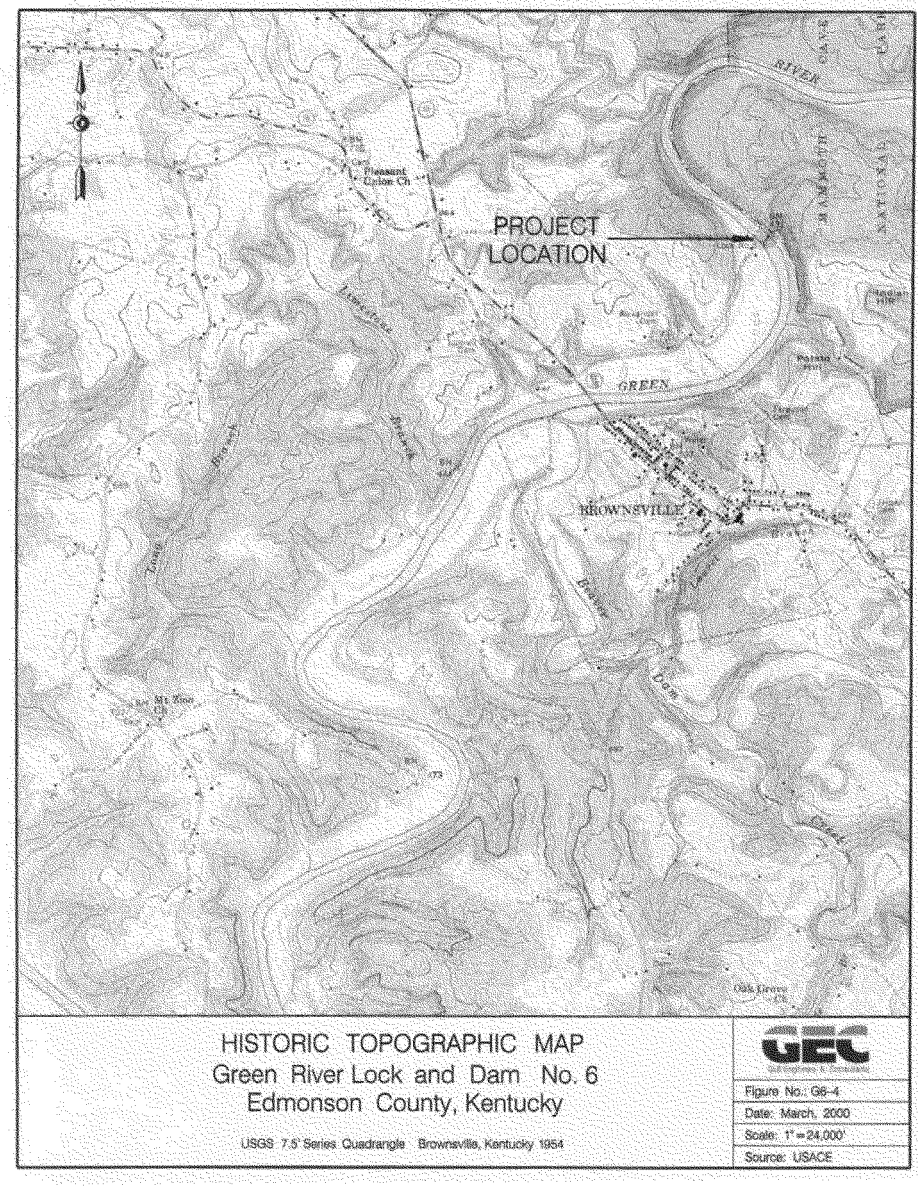


Table G6-1. Federal and State Database Review Summary

Database	< 0.13 Mile	0.13-0.25 Mile	0.25-0.50 Mile	0.50-1.0 Mile	Total
NPL	0	0	0	0	0
RCRIS-CA	0	0	0	0	0
RCRIS-TSD	0	0	0	-	0
CERCLIS	0	0	0	-	0
CERCLIS (S)	0	0	0	-	0
SWLF	0	0	0	-	0
WELLS	0	0	0	-	0
VIOLATERS	0	0	-	-	0
TRIS	0	0	-	-	0
UST/AST	0	0	-	-	0
ERNS	0	-	-	-	0
GNRTR	0	-	-	-	0

Source: G.E.C., February 2000. (-) Outside ASTM-recommended search radius.

5.0 FINDINGS

5.1 Hazardous Substances

This section applies to the storage, handling, transportation, and disposal of substances deemed hazardous under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) at G6.

No evidence of such activity at the site, such as stained soil or distressed vegetation, was noted during the field investigation nor discovered in the process of the federal and state database review.

5.2 Polychlorinated Biphenyls

There is one pole-mounted electrical transformer located at the site and it appears to be marked with a PCB warning label. However, no leaks or stains were observed, and it is G.E.C.'s opinion that little hazard is posed to human health or the environment, however if its removal is required pursuant to any disposal action, it should be done so in accordance with state and local regulations.

5.3 Petroleum Products / Petroleum Derivatives

A two-inch pipe resembling a fill pipe was discovered on the 0.83-acre tract during the field investigation. The pipe extended approximately 1.5-2 feet above grade and might suggest the presence of a UST.

G.E.C. could find no information indicating the use of USTs at G6 during the review of federal and state databases nor in the records provided by the District. Because there were no structures on the left descending bank other than the spring house, it is G.E.C.'s opinion that the pipe is probably not indicative of a UST.

Furthermore, information gathered in the course of this study indicates that the facility never stored significant amounts of petroleum products and/or derivatives or that a release of such material ever occurred. It is G.E.C.'s opinion that there are no hazards to human health or the environment.

5.4 Lead

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the door of the gauging station. Should the paint contain lead, conditions at G6 could pose a hazard to human health. Disturbance or removal of the fittings would have to be conducted in accordance with state and local regulations.

5.5 Asbestos

There appear to be no asbestos concerns at the property.

5.6 Air Quality

There are no apparent air quality issues associated with the property.

5.7 Public Safety

G6 may be the most deteriorated of the locks and dams addressed in this EBS. From a stability standpoint there appear to be items of concern with respect to public safety, and there may be liability associated with continued ownership of the site.

Most notable is the seepage occurring through, and around, the lock. Sinkholes are evident on the right descending bank, and water can be seen seeping under the land wall into the lock chamber and through the sheet pile wall.

The lower pool approach wall, where it runs into the bank, appears to have settled and has rotated outward at the top. The upper pool approach wall appears to be in a state of failure.

The concrete walls also appear to be deteriorating, and a large number of large cracks have formed, allowing a corrosion path to the reinforcement.

5.8 Potential Sites of Concern

G.E.C. was able to locate 14 of the 18 UST/AST sites and they are well outside the ASTM-recommended search radius. Although the remaining four were not located, they were not observed anywhere in the vicinity of the site.

G.E.C. was unable to locate the three solid waste landfill facilities, however information gathered during interviews with local residents indicated that all three facilities are probably located well outside the ASTM recommended search radius.

Accordingly, it is G.E.C.s opinion that none of the 21 unplottable sites are likely to have had any impact on environmental conditions at G6.

5.9 Federal and State Agency Evaluations

5.9.1 Wetlands

A Department of the Interior National Wetlands Inventory Map dated 1988, a portion of which is presented in Figure G6-5, indicates a forested palustrian wetland at the site, in the form of narrow riparian zones adjacent to the river. G.E.C. confirmed this during the field investigation.

5.9.2 Cultural Resources

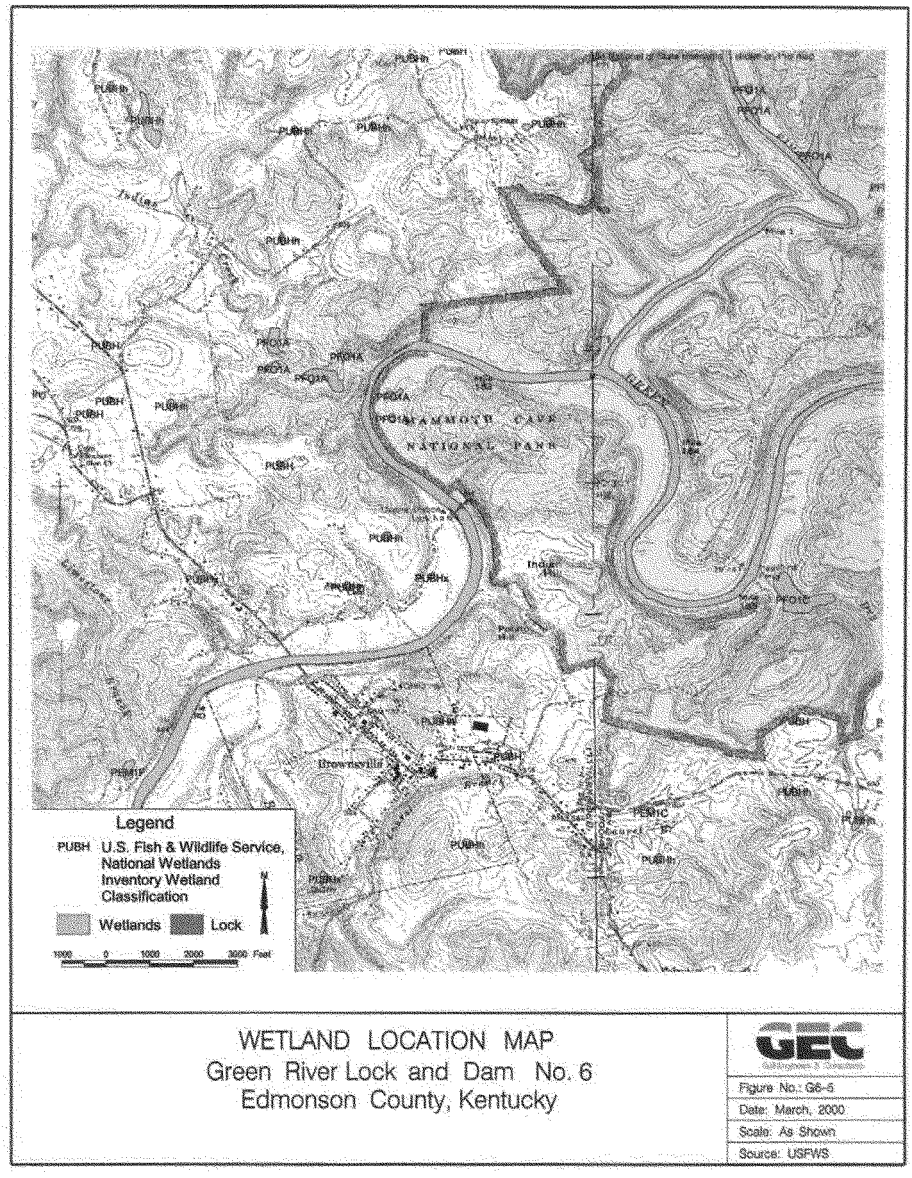
A Phase I Cultural Resources Reconnaissance was performed in 1998 for the site to determine if any archaeological resources would be impacted by federal disposal of the property. The reconnaissance found no evidence of prehistoric or undisturbed historic era cultural remains. Efforts are currently underway to document the existing structures at the facility. To date, the District has completed a brief historical overview of the Green and Barren rivers navigational system and prepared archival quality photo documentation of all extant structures. It is anticipated that the report containing this information will be completed July 2000. The District expects that the facility will be determined eligible for inclusion in the National Register of Historic Places and will require an as yet undetermined level of additional research and documentation.

5.9.3 Threatened and Endangered Species

Threatened and endangered species occur in the Green and Barren rivers and on adjacent terrestrial habitat. The federally endangered Kentucky cave shrimp (*Palaemonias ganteri*) is endemic to the Mammoth Cave system, portions of which are located within the pool created by G6, and the U.S. Fish and Wildlife Service (USFWS) has designated portions of the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park as critical habitat for the species.

Caves in the study area also provide habitat for the federally endangered gray bat and Indiana bat, which use the caves as hibernacula. One cave within the study area is known to support a gray bat maternity colony, and future surveys in additional caves may find other maternity colonies. Suitable habitat for Indiana bat maternity colonies also exists throughout the project area, and additional studies may confirm their presence.

Figure G6-5. NWI Map



The study project area also contains habitat for a variety of federally listed species of birds. Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range. The Federally endangered American peregrine falcon (*Falco peregrinus anatum*) also occurs as a migrant or transient in the study area.

Endangered freshwater mussels in the study area include the rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), pink mucket pearly mussel (*Lampsilis abrupta*), and the fanshell (*Cyprogenia stegaria*). Recently deceased specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have also been observed, indicating their presence in the project area as well. Other listed mussel species that might still occur in the project area include the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Edpioblasma sulcata sulcata*). The orange-footed pearly mussel, ring pink, and purple catspaw pearly mussels still reproduce in the Green River, and it is thought that this one of the few, perhaps the only, rivers where this occurs.

Federally threatened plants found in the study area include Price's potato bean (*Apios priceana*) and Eggert's sunflower (*Helianthus eggertii*).

Rare species for which potential habitat exists in the project area include the southeastern bat (*Myotis austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern small-footed bat (*Myotis leibii*), eastern woodrat (*Neotoma floridana*), Bachman's sparrow (*Aimophila aestivalis*), eastern sand darter (*Ammocrypta pellucida*), northern cave fish (*Amblyopsis spelaea*), southern cave fish (*Typhlichthys subterraneus*), longhead darter (*Percina macrocephala*), blue sucker (*Cycleptus elongatus*), hellbender, Kirtland's water snake (*Clonophis kirtlandi*), cooperbelly water snake (*Nerodia erythrogaster* var. *neglecta*), spectacle case pearly mussel (*Cumberlandia monodonta*), Kentucky creekshell mussel (*Villosa ortnanni*), rabbit's foot pearly mussel (*Ouadrula cylindrica*), purple liliput pearly mussel (*Toxolasma lividus*), pale false foxglove (*Agalinis skinneriana*), royal catchfly (*Silene regia*), and Gattinger's lobelia (*Lobelia appendiculata* var. *gattingeri*). These species are not currently considered candidate species, however, they could be listed in the future if their numbers decline and threats to their survival persist.

6.0 SUMMARY AND CONCLUSION

G6 is located just upstream of Brownsville, in Edmonson County, Kentucky. The site occupies approximately 18.0 acres on the right descending bank and 0.83 acres located on the left

descending bank. Improvements at the site include the lock and dam, a spring house, and a USGS gauging station. Operations commenced on January 1, 1906 and ceased on August 1, 1951. The structure was deactivated on August 31, 1951.

The Corps is considering disposing of federal interest in the facility due to a lack of any continued authorized project purpose, and G.E.C. was contracted to conduct an EBS in order to facilitate the possible transfer. In accordance with applicable requirements contained in AR 200-1 and ASTM E1527-97, G.E.C. reviewed Department of the Army records and federal, state, and local databases, federal and state agency evaluations, conducted historical research of the site and surrounding area, interviewed pertinent personnel, and performed a site investigation in order to characterize environmental conditions at the site.

There is no evidence that hazardous materials were ever stored, handled, transported, or disposed of at the site.

There is evidence suggesting the possible presence of PCBs in a pole-mounted electrical transformer at the site.

There is no evidence that the site ever stored significant amounts of petroleum products and/or derivatives or that a release of such materials ever occurred.

Chipped, cracked, and flaked paint was observed at the site, on bollards, cleats, and rails associated with the lock, and on the door of the gauging station. Should the paint contain lead, conditions at G6 could pose a hazard to human health.

There appear to be no asbestos or air quality concerns at the site.

The lock and dam are deteriorated and there appear to be items of concern with regard to public safety. As a result, there may be liability associated with continued ownership of the site.

Twenty-one unplottable sites of concern were found during the federal and state database review. G.E.C. located 14 of the 21 and they are well outside of the ASTM-recommended search distances, and there is reason to believe the remaining seven sites are also located well away from the site. In any event, it is unlikely that any of the 21 sites has had an impact on conditions at G6.

G.E.C. observed forested palustrian wetlands at the site, and threatened and endangered species are known to occur in the vicinity.

A Phase I Cultural Resources Survey has concluded there is no evidence of prehistoric or undisturbed historic era cultural remains in the vicinity of the site, however the improvements at G6 may themselves be potentially eligible for listing in the National Register of Historic Places.

In accordance with Finding of Suitability to Transfer (FOST) Requirements for Notification, Covenants, and Access, Green River Lock and Dam No. 6 is a Category 1 site, an area where no

release or disposal of hazardous substances or petroleum products has occurred, and no migration of these substances from adjacent areas has occurred.

Appendix F:
Real Estate Interests

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
Disposition Study
South-Central Kentucky

Appendix F. Real Estate

1.0 General

In 1991, the USACE conducted a study to determine if it would be feasible to restore navigation to the upper reaches of the Green River. This study found that the benefits from commercial navigation operations would be insufficient to support restoring navigation. Subsequently, in 2004 the USACE conducted a study to assess the impacts of and make a recommendation to deauthorize Green River Lock & Dam Nos. 3 – 6 and Barren River Lock & Dam No. 1 and relinquish its interest in the property and facilities. No action was taken at that time to act on the study's recommendations; therefore, the USACE maintains the properties in a caretaker status. Green River Lock & Dam Nos. 1 and 2 are still operational.

The purpose of this study is to reexamine the evaluation and recommendations of the 2004 study and update the recommendations regarding the possible deauthorization and disposal of the facilities. The 1993 study, 2004 study and this reevaluation were accomplished under the original authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-611).

The following five commercial navigation facilities on the Green River and Barren River have been decommissioned and are to be evaluated with recommendation for deauthorization. Upon deauthorization, disposal of the facilities including adjacent properties will take place pending availability of funding through normal Operation's budget sources. A summary of current real estate holdings for each site can be found in Table 1 of Section 8.0 of this appendix.

2.0 Green River Lock & Dam No. 3 (Rochester Dam)

2.1 Site Description

The site contains a total area of 11.71 fee acres, consisting of 4.99 acres located in Muhlenberg County and 6.72 acres located in Ohio County a short distance downstream from Rochester, Kentucky at Green River Mile 108.5. This lock was closed to navigation in September 1981. It has access from paved roads and a gravel parking lot maintained by Muhlenberg County. The south end is covered with brush. A sandstone bluff is just north of the parking lot with a grassy area on the very north end. The Ohio County side also has access from paved roads. It has the remains of a solid brick dwelling and two metal sheds. The north end of the 6.72 acres has reverted to heavy brush. The topography is nearly level. A well and septic tank are present and electricity is available to the site. A map of the area is attached as Exhibit RE-1.

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
Disposition Study
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2.2 Summary of Land Acquisitions

Parcel A
6.72 acres located in Ohio County, Kentucky included 3.47 acres acquired from Prudence Bowles, et al by Court Order dated 04 February 1895, 0.25 acres acquired by Court Order from J.P. Shrum by Court Order dated 04 February 1895, and 3.00 acres ceded to the United States by the Commonwealth of Kentucky 29 February 1886. The Court awarded the property owners $600.00 for 3.47 acres and $150.00 for 0.25 acres.

Parcel B
10.00 acres located in Muhlenberg County, Kentucky ceded to the United States by the Commonwealth of Kentucky 29 February 1886.

2.3 Completed Real Estate Disposal Actions

A portion of Parcel B consisting of 5.01 acres was reported excess and conveyed to Muhlenberg County for public park and recreation purposes by the U.S. Department of the Interior 13 August 1980. The United States reserved the mineral rights and a perpetual flowage easement and right-of-way for construction and maintenance, along with the right to erode the riverbank. The deed provided that title shall revert to the United States if needed for national defense purposes.

2.4 Current United States Land Holdings

The United States currently owns 4.99 acres fee simple and 5.01 acres of perpetual flowage easement and right-of-way for construction and maintenance in Muhlenberg County and 6.72 acres fee simple in Ohio County.

Remaining improvements constructed by the Corps of Engineers are the dam structure, lock, lockmaster's house, a maintenance and office building, and garage. Total cost of improvements on real property inventory is $353,000.

2.5 Highest and Best Use and Land Value

Highest and best use of the 4.99 acres in Muhlenberg County is considered residential. A Real Estate staff appraiser has estimated the value at $12,000. A value of $1 each has been assigned to the easements. Highest and best use of the 6.72 acres in Ohio County is considered residential. A Real Estate staff appraiser has estimated the value at $17,000. Improvements have had no value placed on them. Existing condition of improvements finds the dam sound, lock walls sound, and buildings in poor condition. There are no minerals of any value at this site.

2.6 Outgrants

There are no active outgrants at this site.

3.0 Green River Lock & Dam No. 4 (Woodbury Dam)

3.1 Site Description

This site is located at Green River Mile 149.0. All of the land at this site has been disposed of except for 0.01 of an acre of Parcel A that was retained for a gauging station. A map of the area is attached as Exhibit RE-2.

3.2 Summary of Land Acquisitions

Parcel A
1.70 acres fee simple acquired from the Evansville & Bowling Green Packet Company by Commissioner's Deed dated 25 September 1911, recorded 11 October 1911, in Deed Book 19, page 366 in the records of Butler County, Kentucky. Acquisition cost $150.00.

Parcel B
0.50 acre fee simple acquired from J.W. Newton by Commissioner's Deed dated 25 September 1911, recorded in Deed Book 19, page 362 in the records of Butler County, Kentucky. Acquisition cost $200.00.

Parcel C
0.60 acre fee simple was acquired from E.C. and Ida L. Kuykendall by Commissioner's Deed dated 25 September 1911, recorded 11 October 1911 in Deed Book 19, page 358 in the records of Butler County, Kentucky. Acquisition cost $400.00.

Parcel D
13.70 acres fee simple acquired from H.S. McGinis by Commissioner's Deed dated 25 September 1911, recorded in Deed Book 19, page 353 in the records of Butler County, Kentucky. Acquisition cost $2,000.00.

Parcels E & F
10.27 acres fee simple ceded by the Commonwealth of Kentucky by an act of the General Assembly approved 20 February 1886; and from the Green & Barren River Navigation Company by deed dated 31 August 1888. Acquisition cost unknown.

3.3 Completed Real Estate Disposal Actions

A portion of Parcel D containing 6.27 acres was conveyed to Harry Barrett by Quitclaim Deed dated April 9, 1955. An easement for a right-of-way (not to exceed a width of 16') extending over the Government reservation and along the west boundary from the existing street was also granted. The United States reserved a perpetual flowage easement over the entire 6.27 acres.

Portions of Parcels C and E and all of Parcel B containing in all 4.73 acres were conveyed to Euda C. House and Coweta House by Quitclaim Deed dated March 20, 1958, recorded April 7, 1958 in Deed Book 72, page 462 in the records of Butler County, Kentucky. The United States reserved a perpetual easement for ingress and egress over the entire 4.73 acres.

A portion of Parcel D containing 1.89 acres was conveyed to N.B. Hudson by Quitclaim Deed dated December 20, 1973. The deed also granted an easement (not to exceed a width of 16') for joint and concurrent use with others of a right-of-way extending over the Government reservation and along the west boundary from the existing street. No reservations to the United States were included in the deed.

Portions of Parcels D and E containing 8.59 acres were conveyed to Butler County, Kentucky for public park and recreation purposes by Quitclaim Deed dated January 10, 1975, recorded January 13, 1975 in Deed Book 93, page 619 in the records of Butler County, Kentucky. Conveyance was subject to a perpetual easement for right-of-way extending along the west boundary from the north end of an unnamed street on the north end of the town of Woodbury, Kentucky to a 6.27 acre tract conveyed by the Department of the Army to Harry Barrett. The United States reserved all mineral interests. The deed provided that title shall revert to the United States if needed for national defense purposes.

Portions of Parcels A, C, and E and all of Parcel F containing in all 5.26 acres were reported excess and conveyed to Butler County, Kentucky for public park and recreation purposes by the U.S. Department of the Interior by Quitclaim Deed dated November 25, 1987. The United States reserved the mineral rights, a perpetual flowage easement, and a right-of-way easement for ingress and egress over the entire 5.26 acres. The deed provided that title to the land shall revert to the United States if needed for national defense purposes. The United States retained 0.01 acres of fee simple interest of Parcel A for a gauging station.

3.4 Current United States Land Holdings

The United States currently owns 0.01 acres of fee simple, 11.53 acres of perpetual flowage easement, 9.99 acres of right-of-way easement for ingress and egress, and the mineral interests

on 13.85 acres. (The original acreage minus disposal acreage equals 0.03 acres. However, research of the disposal deeds indicates that the United States only reserved 0.01 acre for a gauging station.) Remaining improvements consist of a lock and gauge house. Total cost of improvements on real property inventory is $257,000.

3.5 Highest and Best Use and Land Value

Highest and best use of the 0.01 acres is considered recreational purposes as it is adjacent to a public park. A Real Estate staff appraiser states that a value of $1 for each estate is applicable. Improvements found to be in fair to poor condition. Improvements have had no value placed on them. There are no minerals of any value at this site.

3.6 Outgrants

There are no active outgrants at this site.

4.0 Green River Lock & Dam No. 5 (Glenmore Dam)

4.1 General Description of the Site

The site is located at Green River Mile 168.1 and was deactivated in August 1951.It contains a total area of 32.28 acres. The lock side of the site consists of 27.07 acres fee simple in Butler County, Kentucky, of which 2.39 acres of fee simple are currently used as a road. Butler County currently maintains the paved portion of the road. The abutment side consists of 5.21 acres fee simple in Warren County, Kentucky. Approximately half of the 27 acres in Butler County is heavily wooded with steep grades. The other half is covered in thick brush and is nearly level. The 5.21 acres located on in Warren County is heavily wooded and has poor access. Topography ranges from nearly level to steep. A map of the area is attached as Exhibit RE-3.

4.2 Summary of Land Acquisitions

Parcel A
6.70 acres acquired from D.J. Honaker, et al. by deed dated 3 January 1902, recorded 24 March 1902, in Deed Book 10, page 510 in the records of Butler County, Kentucky. Acquisition cost $201.00.

Parcel B
7.28 acres acquired from D.J. Honaker, et al. by deed dated 16 October 1895 recorded in Deed Book 7, page 304 in the records of Butler County, Kentucky. Acquisition cost $217.77.

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
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Parcel C
1.30 acres acquired from P.M. Honaker by deed dated 16 October 1895, recorded in Deed Book 7, page 302 in the records of Butler County, Kentucky. (Acquired for road access.) Acquisition cost $38.94.

Parcel D
0.55 acres acquired from P.M. Honaker by deed dated 4 December 1903, recorded in Deed Book 14, page 216, in the records of Butler County, Kentucky. (Acquired for road access.) Acquisition cost $10.00.

Parcel E
0.05 acres acquired from John Stephens, et al. by deed dated 4 December 1903, recorded in Deed Book 14, page 218, in the records of Butler County, Kentucky. (Acquired for road access.) Acquisition cost $10.00.

Parcel F
2.45 acres acquired from Williem Runner, et al by Declaration of Taking on 28 June 1898, recorded in Deed Book 88, page 558 in the records of Warren County, Kentucky. Court award $100.00.

Parcel G
5.21 acres acquired from R.H. Runner, et al. by deed dated 7 December 1933, recorded 17 March 1934, in Deed Book 173, page 311, in the records of Warren County, Kentucky. Acquisition cost $781.50.

Parcel H
14.82 acres acquired from Ethel Honaker, et al. by deed dated 11 January 1934, recorded 3 March 1934, in Deed Book 43, page 280, in the records of Butler County, Kentucky. Acquisition cost $2,223.00.

Parcel I
6.86 acres acquired from Lizzie G. Hays, et al. by deed dated 18 August 1933, recorded 9 September 1933, in Deed Book 43, page 134, in the records of Butler County, Kentucky. Acquisition cost $1,029.00.

4.3 Completed Real Estate Disposal Actions

All of Parcel F consisting of 2.45 acres was conveyed to J.D. Spalding by Quitclaim Deed dated 9 April 1955. The United States reserved a perpetual flowage easement over the entire 2.45 acres and a right-of-way easement for all Government-owned roads and utilities.

Portions of Parcels H and I consisting of 10.49 acres were conveyed to E.E. Hays by Quitclaim Deed dated 9 April 1955. A 30-foot right-of-way easement was also granted to Mr. Hays and his heirs and assigns extending across the Government reservation from the existing road at the north-west corner thereof (ROW forfeited for nonuse for a period of two consecutive years or for abandonment). The United States reserved a perpetual flowage easement over the entire 10.49 acres and a right-of-way easement for all Government-owned roads and utilities.

4.4 Current United States Land Holdings

The United States currently owns 27.07 acres fee simple and 10.49 acres of perpetual flowage easement in Butler County and 5.21 acres fee simple and 2.45 acres of perpetual flowage easement in Warren County. Improvements are the dam structure, operations building and lock. Total cost of improvements on the real property inventory is $569,000.

4.5 Highest and Best Use and Land Value

Highest and best use of the 27.07 acres in Butler County is considered recreational with agricultural as a secondary use. A Real Estate staff appraiser has estimated the value of the 27.06 acres at $24,000. Highest and best use of the 5.21 acres in Warren County is considered recreational with a secondary use of agricultural. A Real Estate staff appraiser has estimated the value of the 5.21 acres at $8,000. A value of $1 each has been assigned to the easements. The improvements were found to be in poor condition. No value has been placed on the improvements. There are no minerals of any value.

4.6 Outgrants

There are no active outgrants at this site.

5.0 Green River Lock & Dam No. 6

5.1 Site Description

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
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The site is located at Green River Mile 181.7 in Edmonson County, Kentucky and was decommissioned in August 1951. The site has a total acreage of 22.19 acres, consisting of 18.00 acres fee simple located on the lock side of the dam, 0.83 acres fee simple located on the abutment side of the dam, and 3.36 acres fee simple also located across the river from the lock and used for road access to the 0.83 acre tract.

The 18.0 acres on the lock side are accessed by Edmonson County Road No. 183. The county road changes to gravel and terminates near the Government boundary. Other than a wooded hillside, the 18.0 acres was previously cleared. It has reverted to brush with a few mature trees. A terrace area occupies much of the site and lies along the base of the hillside. The 0.83 acre site was originally part of a larger tract that was transferred in 1988 to the United States Department of the Interior, National Park Service at no cost. The 0.83 is heavily wooded with steep topography. It lies between the Green River and Mammoth Cave National Park. A map of the area is attached as Exhibit RE-4.

5.2 Summary of Land Acquisition

Parcel A
18.00 acres fee simple acquired from Jesse T. Alexander, et al. by deed dated 11 January 1904, recorded 14 January 1904, in Deed Book V, Page 541 in the records of Edmonson County, Kentucky. Acquisition cost $900.00.

Parcel B
4.55 acres fee simple acquired from Joseph G. Madison, et al., by deed dated 9 March 1903, recorded 29 December 1903 in Deed Book V, page 516 in the records of Edmonson County, Kentucky. Acquisition cost $227.50.

Parcel C
4.94 acres fee simple acquired (for the placement of an access road) on the abutment side of Green River acquired from A.D. Cook, C.M. James, et al., by deed dated 7 September 1909, recorded 10 November 1909 in Deed Book 7, page 612 in the records of Edmonson County, Kentucky. Acquisition cost $203.35.

Parcel D
0.92 acres fee simple (for the placement of an access road) on the abutment side of Green River acquired from A.D. Cook, et al., by deed dated 7 September 1909, recorded 10 November 1909, in Deed Book 7, page 607 in the records of Edmonson County, Kentucky. Acquisition cost $16.78.

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
Disposition Study
South-Central Kentucky

5.3 Completed Real Estate Disposal Actions

Portions of Parcel B and C consisting of 6.22 acres were transferred on 2 September 1988 to the United States Department of the Interior, National Park Service. Approximately 0.83 acres of Parcel B along with the right of ingress and egress over the 6.22 acres conveyed was retained for maintenance of the dam.

5.4 Current United States Land Holdings

The United States currently owns 22.19 acres in fee simple and 6.22 acres of right of ingress and egress for maintenance to the lock and dam. Improvements consist of a dam structure, gauge house, and lock. Total cost of improvements on real property inventory is $492,152.25. There is a U.S.G.S. stream gauging station currently located on Parcel A.

5.5 Highest and Best Use and Land Value

Highest and best use of the 18.00 acres located on the lock side of Green River is considered recreational. A Real Estate staff appraiser has estimated the value at $22,000.

Highest and best use of the 0.83 acres and 3.36 acres of roadway on the abutment side of the lock and dam is considered recreational as a part of the existing national park and roadway. A Real Estate staff appraiser has estimated the value of the 0.83 acres at $1 and the 3.36 acres of roadway at $1. A value of $1 has been assigned to each easement.

Improvements were found to be in fair to poor condition. No value has been placed on them. There are no minerals of any value at this site.

5.6 Outgrants

There are no active outgrants at this site.

6.0 Barren River Lock & Dam No. 1

6.1 Site Description

The site consists of 16.63 acres fee simple and is located in Warren County, Kentucky approximately 1 mile upstream from the town of Greencastle. It is also located at Barren River Mile 15.0 and was closed to navigation as a result of the loss of the lower pool associated with the failure of Green River Dam No. 4. Access is by a dirt road. The south end of the site is covered in brush and a small ditch forms the north boundary of the site. A map of the area is attached as Exhibit RE-5.

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
Disposition Study
South-Central Kentucky

6.2 Summary of Land Acquisition

Parcel A
15.00 acres fee ceded by the Commonwealth of Kentucky to the United States. The United States condemned in 1895 to clear title. Court determined cost to be $550.00.

Parcel B
13.1 acres fee acquired from Charles E. Miller and Hester Miller by deed dated 11 August 1933, recorded 8 September 1933 in Deed Book 172, page 367 in the records of Warren County, Kentucky. Acquisition cost $1,800.00.

6.3 Completed Real Estate Disposal Actions

A portion of Parcels A and B consisting of 3.47 acres along with eight buildings was conveyed to George W. Inman and Barbara L. Inman by Quitclaim Deed dated 20 January 1975. No reservations to the United States were included in the Quitclaim Deed.

A portion of Parcels A and B consisting of 8.00 acres was conveyed to James C. Long by Quitclaim Deed dated 9 April 1955, together with a 30-foot right-of-way easement to Barren River for watering livestock. In accordance with the Quitclaim Deed, the right-of-way is void due to nonuse. The United States reserved a perpetual flowage easement and right-of-way for Government-owned roads and utilities over the entire 8.00 acres.

6.4 Current United States Land Holding

The United States currently owns 16.63 acres in fee simple and 8.00 acres of perpetual flowage easement and right-of-way for construction and maintenance.

The Commonwealth of Kentucky constructed the original lock and dam in 1841. The Corps of Engineers built a new lock and dam in 1933-1934 at the same site. The dam enhances the water supply for the city of Bowling Green, Kentucky. Total cost on real property inventory of improvements is $1,478,610.25.

6.5 Highest and Best Use and Land Value

Highest and best use is considered recreational. A Real Estate staff appraiser has estimated the value of the 16.63 acres owned in fee simple at $25,000. A value of $1 each has been assigned to the easements. The existing improvements lock and dam were found to be in good to fair

condition. No value has been placed on the improvements. There are no minerals of any value at this site.

6.6 Outgrants

There are no active outgrants at this site.

7.0 Real Property Disposal Procedure

In order to dispose of all of the land at the projects listed above to include the lock and dam structures, legislation would have to be enacted to deauthorize the project. If deauthorization legislation does not set out specific guidelines for conveyance, the property will be disposed of in accordance with the Federal Property and Administrative Services Act of 1949 and Army regulations. The disposal process begins with an estimate of the current fair market value. The Department of Defense has a delegation of authority from the U.S. General Services Administration (GSA) that allows the USACE to dispose of excess real property whose estimated fair market value is less than $50,000. This delegation does not preclude the GSA from disposing of property on behalf of the USACE.

7.1 Disposal by the U.S. General Services Administration

A Report and Recommendation of Excess (RROE) is prepared and submitted, along with environmental and cultural resources clearances, through the Great Lakes and Ohio River Division to USACE headquarters for approval. When approval of the RROE is received, the USACE would screen the property with the Department of Defense for interests. If there is no Department of Defense interest, a SF 118 - Report of Excess Real and Related Personal Property would then be prepared and forwarded to the appropriate GSA regional office. GSA would perform the disposal including screening with the Department of Housing and Urban Development, and Federal, state and local governments.

Early coordination with GSA's Real Property Utilization and Disposal Division indicates the properties will most likely be accepted for disposal "as is", subject to physical inspections by GSA staff. The USACE would remain the responsible landholding agency during the disposal process.

7.2 Disposal by the USACE

A Report and Recommendation of Excess (RROE) is prepared and submitted, along with environmental and cultural resources clearances, through the Great Lakes and Ohio River

Division to USACE headquarters for approval. After approval of the RROE is received, environmental and cultural resources requirements are completed and the property is screened with nondefense federal agencies, the Department of Defense, Department of Housing and Urban Development, Federal, state, and local governments for any interest. If no interest is expressed, the property would be disposed of by negotiated or competitive sale to the public.

Conveyance would be made subject to existing easements for public roads and highways, public utilities, railroads and pipelines; and to reservations, exceptions and any other outstanding rights contained in or referred to in patents issued by the United States of America. The USACE would not retain any liability for the property upon disposal.

The Louisville District real estate administrative costs for processing a disposal action will vary depending on specifics of the project but are estimated to be approximately $10,000 per site.

7.3 General Disposal Discussion

Deauthorization of the projects is not anticipated to alter the United States' ownership of the structures in the waterway. The purpose of seeking deauthorization is to allow the District to dispose of the lands and structures. The District will convey all right, title and interest it has by way of a quitclaim deed. There is a precedent for disposing of locks and dams in Kentucky as evidenced by the successful transfer of Kentucky River Locks and Dams 5-14 that occurred in the 1990's. Special legislation was drafted that directed the District to dispose of the lands and structures to a state agency. If deauthorizing legislation is silent on the recipient or method of disposal then appropriate measures would be undertaken by the Real Estate Division and Office of Counsel to resolve questions of ownership, rights to transfer, the role of the State, etc.

After deauthorization, no permits or licenses will be required from the Commonwealth to maintain the structures in the waterway. The Louisville District's Regulatory Office has advised that the structures would be grandfathered in. A 404 Permit would only be required by a new owner if the structures were modified.

If congressional disposal direction is not made available to the Corps then special coordination and requirements can be placed in the quitclaim deed issued by GSA. Regarding continued "caretaker" status of the projects, the District has not had funding to maintain the properties in many years. Though not expected, if the need arose to address a situation at one of the projects after deauthorization, Operation Division would still have a number of avenues to request funding for maintenance or remedial activities.

Green River Lock & Dam Nos. 3, 4, 5 & 6 and Barren River Lock & Dam No. 1
Disposition Study
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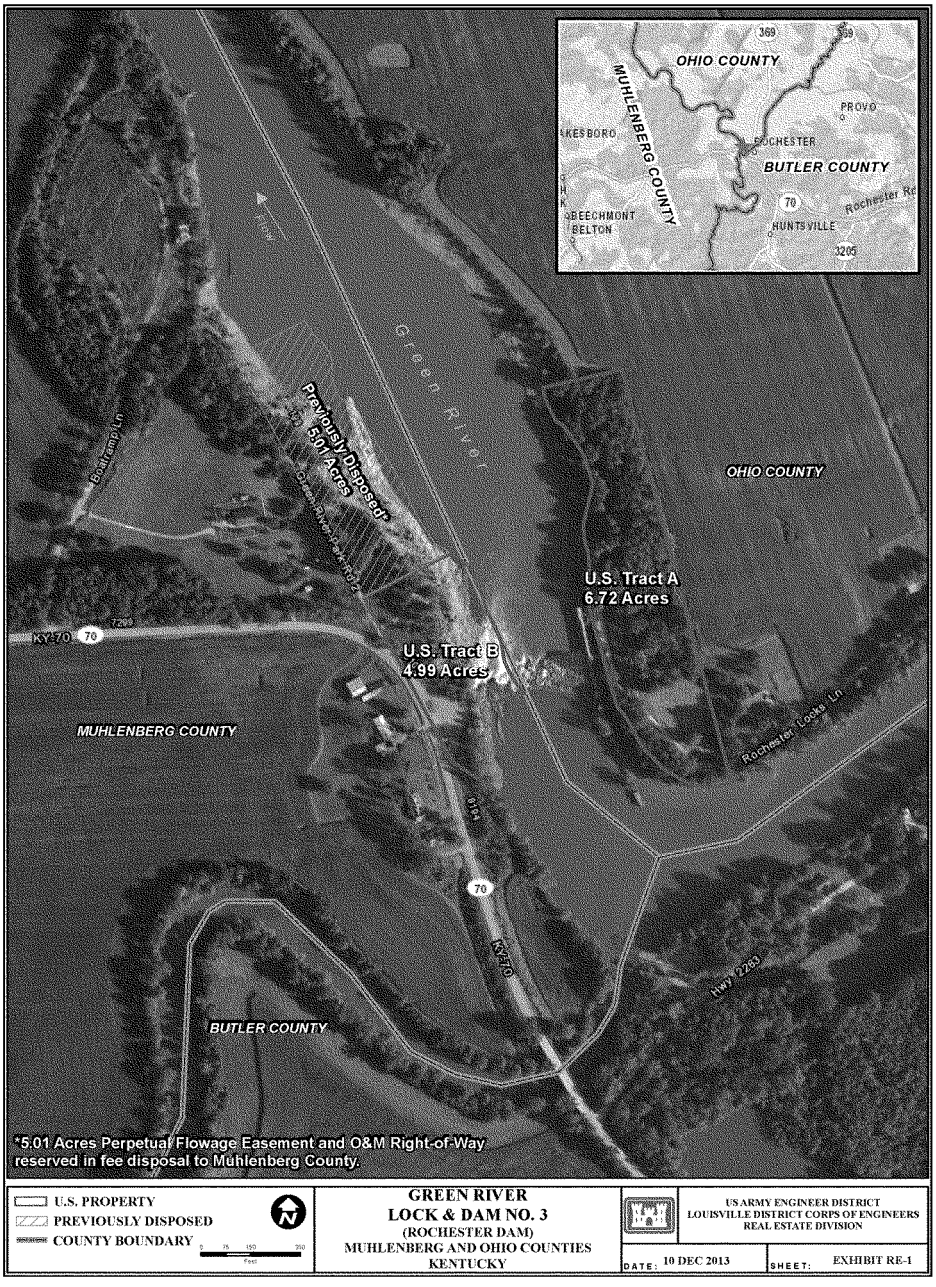
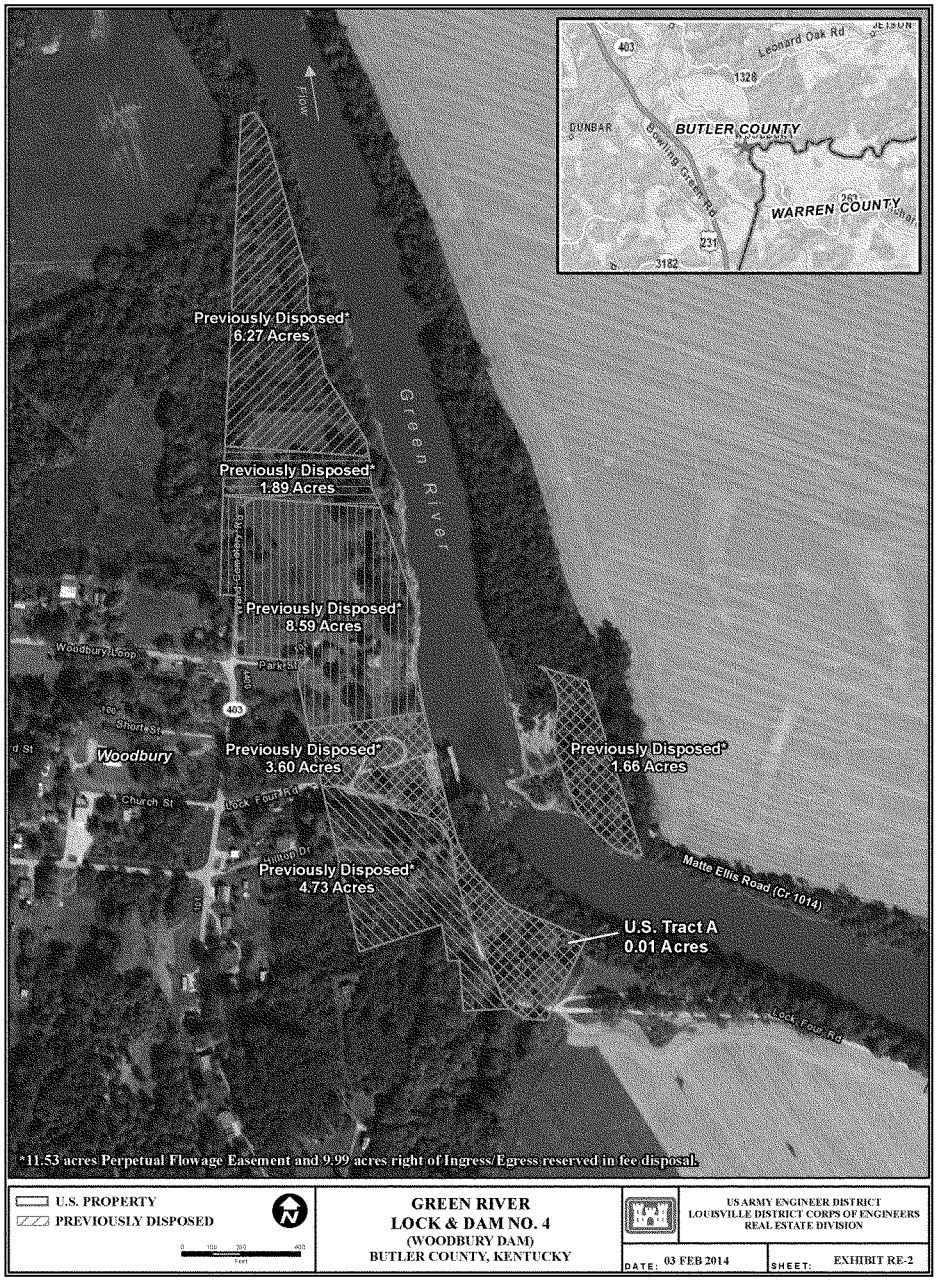
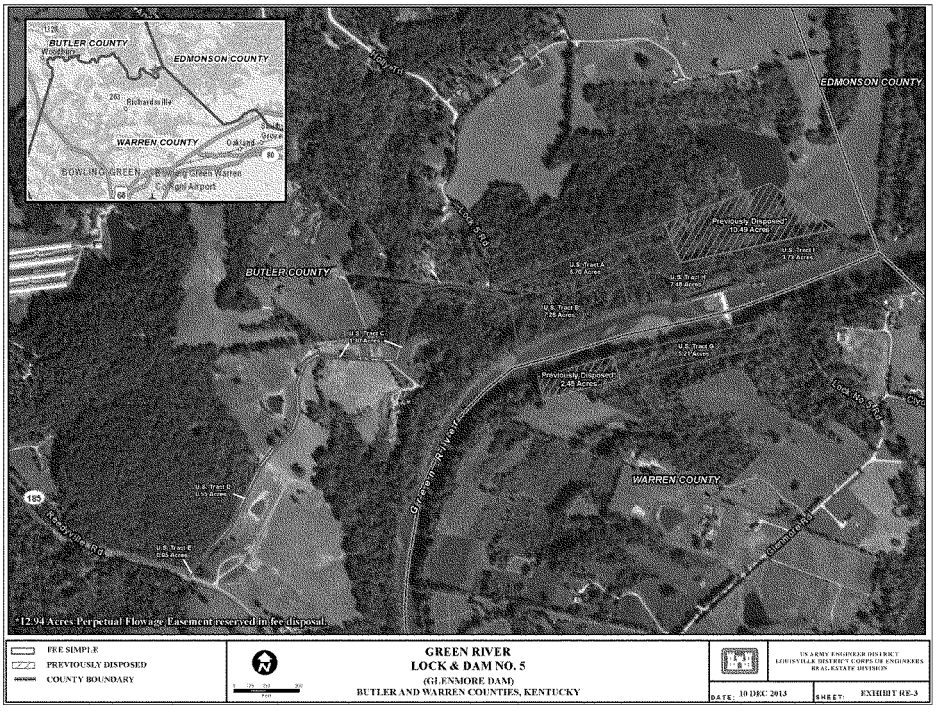
8.0 Real Estate Summary

Table 1

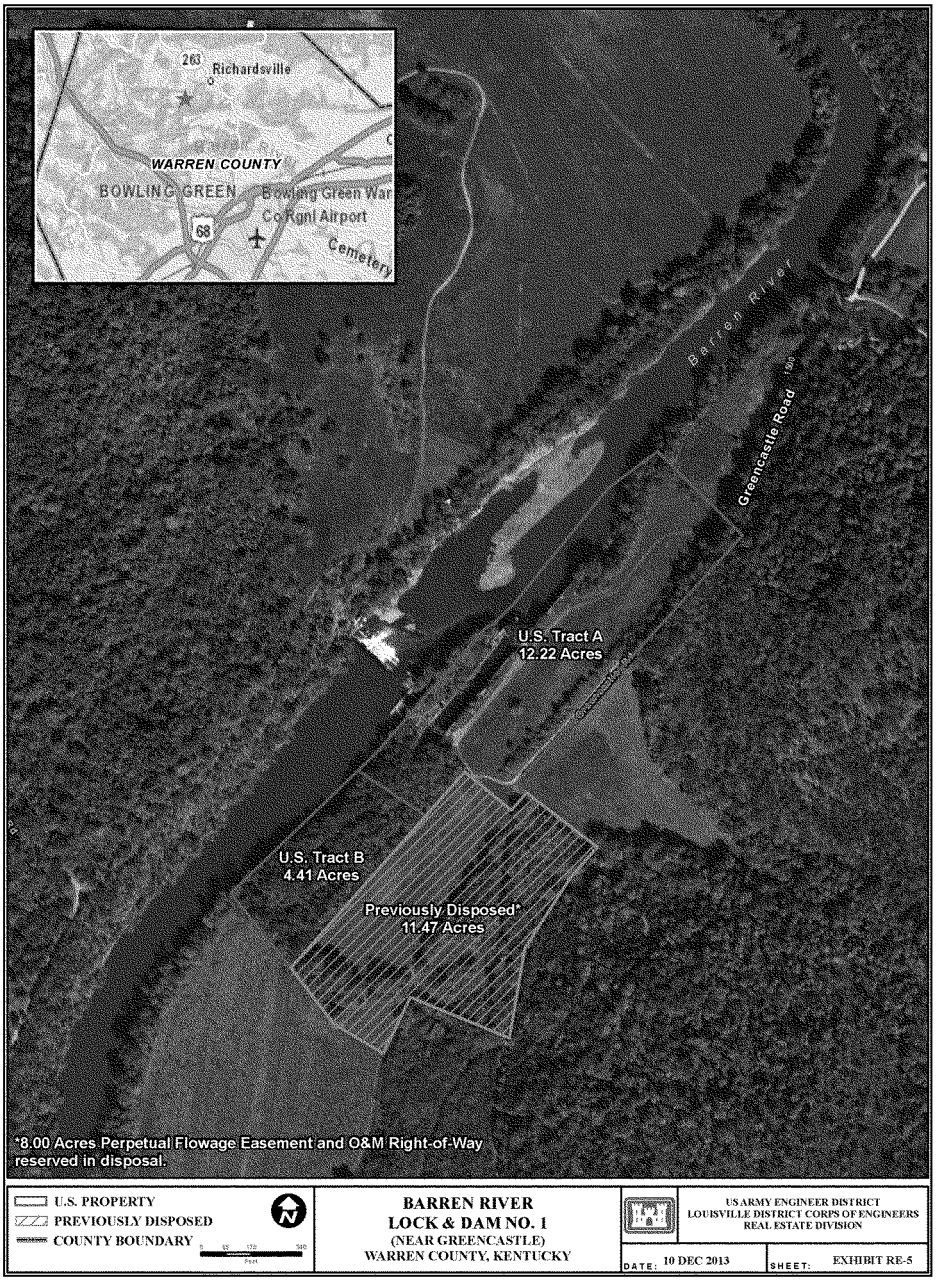
SITE	ACRES ACQUIRED	ACRES PREVIOUSLY DISPOSED	REMAINING ACREAGE FOR DISPOSAL	APPRAISED VALUE
GREEN RIVER LOCK & DAM NO. 3	16.72	5.01	11.71 Fee 5.01 Flowage Easement 5.01 Ingress & Egress Easement	$29,000 $1.00 $1.00
GREEN RIVER LOCK & DAM NO. 4	26.77	26.74	0.01* Fee 11.53 Flowage Easement 9.99 Ingress & Egress Easement 13.85 Mineral Interests	$1.00 $1.00 $1.00 $1.00
GREEN RIVER LOCK & DAM NO. 5	45.22	12.94	32.28 Fee 12.94 Flowage Easement Unknown Utility/Road Easements	$32,000 $1.00 $1.00
GREEN RIVER LOCK & DAM NO. 6	28.41	6.22	22.19 Fee 6.22 Ingress & Egress Easement	$22,000 $1.00
BARREN RIVER LOCK & DAM NO. 1	28.10	11.47	16.63 Fee 8.00 Flowage Easement 8.00 Ingress & Egress Easement Unknown Utility/Road Easements	$25,000 $1.00 $1.00 $1.00
*Original acreage minus disposal acreage equals 0.03 acres; however, research of the disposal deeds indicates that the U.S only reserved 0.01 acres for the placement of a gauging station.				
All sites have Government-owned improvements; no value has been placed on any of them.				


OHIO COUNTY
MUHLENBERG COUNTY
PROVO
ROCHESTER
BUTLER COUNTY
BEECHMONT
BELTON
HUNTSVILLE
Rochester Rd
369
70
3205
Green River
Previously Disposed*
5.01 Acres
Boatramp Ln
Green River Park Rd 2
OHIO COUNTY
U.S. Tract A
6.72 Acres
U.S. Tract B
4.99 Acres
KY-70
70
MUHLENBERG COUNTY
Rochester Locks Ln
70
KY-70
Hwy 2283
BUTLER COUNTY
*5.01 Acres Perpetual Flowage Easement and O&M Right-of-Way reserved in fee disposal to Muhlenberg County.
U.S. PROPERTY
PREVIOUSLY DISPOSED
COUNTY BOUNDARY
GREEN RIVER
LOCK & DAM NO. 3
(ROCHESTER DAM)
MUHLENBERG AND OHIO COUNTIES
KENTUCKY
US ARMY ENGINEER DISTRICT
LOUISVILLE DISTRICT CORPS OF ENGINEERS
REAL ESTATE DIVISION
DATE: 10 DEC 2013
SHEET: EXHIBIT RE-1


Flow
Green River
Previously Disposed*
6.27 Acres
Previously Disposed*
1.89 Acres
Previously Disposed*
8.59 Acres
Previously Disposed*
3.60 Acres
Previously Disposed*
1.66 Acres
Previously Disposed*
4.73 Acres
U.S. Tract A
0.01 Acres
Woodbury Loop
Park St
Short St
Woodbury
Church St
Lock Four Rd
Hilltop Dr
Matte Ellis Road (Cr 1014)
Lock Four Rd
403
Leonard Oak Rd
1328
DUNBAR
BUTLER COUNTY
Bowling Green Rd
WARREN COUNTY
231
3182
*11.53 acres Perpetual Flowage Easement and 9.99 acres right of Ingress/Egress reserved in fee disposal.
U.S. PROPERTY
PREVIOUSLY DISPOSED
GREEN RIVER
LOCK & DAM NO. 4
(WOODBURY DAM)
BUTLER COUNTY, KENTUCKY
US ARMY ENGINEER DISTRICT
LOUISVILLE DISTRICT CORPS OF ENGINEERS
REAL ESTATE DIVISION
DATE: 03 FEB 2014
SHEET: EXHIBIT RE-2


BUTLER COUNTY
EDMONSON COUNTY
WARREN COUNTY
Richardsville
Oakland
BOWLING GREEN
Bowling Green Warren
Cottage Airport
Holly Rd
Lock 5 Rd
Previously Disposed*
10.49 Acres
U.S. Tract A
U.S. Tract B
U.S. Tract C
U.S. Tract D
U.S. Tract E
Previously Disposed*
2.48 Acres
Lock No 5 Rd
Glenmore Rd
Greenville Rd
Green River
*12.94 Acres Perpetual Flowage Easement reserved in fee disposal.
FEE SIMPLE
PREVIOUSLY DISPOSED
COUNTY BOUNDARY
GREEN RIVER
LOCK & DAM NO. 5
(GLENMORE DAM)
BUTLER AND WARREN COUNTIES, KENTUCKY
US ARMY ENGINEER DISTRICT
LOUISVILLE DISTRICT CORPS OF ENGINEERS
REAL ESTATE DIVISION
DATE: 10 DEC 2013
SHEET: EXHIBIT RE-3


*6.22 Acres Ingress & Egress reserved in fee transfer to the Department of the Interior, NPS.
Previously Disposed* 3.72 Acres
U.S. Tract B 0.83 Acres
Previously Disposed* 2.50 Acres
U.S. Tract A 18.66 Acres
U.S. Tract C 2.44 Acres
U.S. Tract D 0.92 Acres
Green River
Brownsville, KY
Houchins Ferry Rd
Cow Rd
Park Rd
GRAYSON COUNTY
HART COUNTY
BUTLER COUNTY
EDMONSON COUNTY
WARREN COUNTY
FEE SIMPLE
PREVIOUSLY DISPOSED
COUNTY BOUNDARY
GREEN RIVER
LOCK & DAM NO. 6
(NEAR BROWNSVILLE)
EDMONSON COUNTY, KENTUCKY
US ARMY ENGINEER DISTRICT
LOUISVILLE DISTRICT CORPS OF ENGINEERS
REAL ESTATE DIVISION
DATE: 10 DEC 2015
SHEET: EXHIBIT RE-4


263
Richardsville
WARREN COUNTY
BOWLING GREEN
Bowling Green War
Co Rgnl Airport
68
Cemetery
Barren River
Greencastle Road
U.S. Tract A
12.22 Acres
U.S. Tract B
4.41 Acres
Previously Disposed*
11.47 Acres
*8.00 Acres Perpetual Flowage Easement and O&M Right-of-Way reserved in disposal.
U.S. PROPERTY
PREVIOUSLY DISPOSED
COUNTY BOUNDARY
BARREN RIVER
LOCK & DAM NO. 1
(NEAR GREENCASTLE)
WARREN COUNTY, KENTUCKY
US ARMY ENGINEER DISTRICT
LOUISVILLE DISTRICT CORPS OF ENGINEERS
REAL ESTATE DIVISION
DATE: 10 DEC 2013
SHEET: EXHIBIT RE-5

Appendix G:
U.S. Fish and Wildlife Service (USFWS) Coordination

This appendix contains the following documents:

1. USFWS Letter dated 21 July 2014
2. USFWS Letter dated 7 April 2014
3. USFWS Fish and Wildlife Coordination Act Report dated 28 March 2014
4. USFWS Fish and Wildlife Coordination Act Report dated June 1999

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

July 21, 2014

Ms. Sharon M. Bond
Chief, Planning Branch
Louisville District, Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: FWS #2014-B-0283; Changes to Green and Barren Rivers Disposition Feasibility Study and Endangered Species Act effects determinations

Dear Ms. Bond:

The Service received your letter dated June 27, 2014 regarding the Corps' recommended changes to the draft Green and Barren Rivers Disposition Feasibility Study (Study). The recommendations that are proposed by the Corps differ from those contained in the draft Study submitted to USFWS on February 14, 2014. The newly-proposed recommendations were discussed via a June 20, 2014 teleconference between the Service and Corps. We were anticipating receipt of the proposed changes and appreciate the Corps' efforts to coordinate with us on these changes and Study.

It is our understanding that the plan for the final Study, as currently proposed, is limited to Congressional de-authorization of commercial navigation for Green River Lock and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. The changes from the original Study to the current plan include:

1. Removal of Green River Dam 6 is not included in the revised plan;
2. The installation of a concrete plug on the upstream miter gates at Green River Lock 3 is not included in the revised plan;
3. Barricades and signage are not included in the revised plan, although the Corps intends to proceed with the installation of barricades and signage under its existing authority and using existing funds for Corps Operations and Maintenance activities; and
4. The disposal of project properties is not included in the revised recommended plan. However, following Congressional de-authorization of commercial navigation at these facilities, a logical next step would be to seek disposal of these properties and facilities through the established Corps and General Services Administration procedures as outlined in the Federal Property and Administrative Services Act of 1939 and Army regulations, and the Corps acknowledges that any potential environmental effects would need to be considered by the Corps before such action(s) could occur.

The Corps' June 27, 2014 letter also requested that the Service respond in writing to the new recommendations and specifically address the Corps' Endangered Species Act compliance responsibilities as they relate to the revised plan (as described above). Further, the Corps' requested our concurrence with the determination that the revised plan will have no effect on listed species.

With this letter, the Service acknowledges the changes to the plan, and we agree with the Corps' determination that the plan will have no effect on listed species. We agree with this determination because the Corps has, at this point, chosen to modify its action so that the revised plan a) is entirely a programmatic, administrative action and 2) removes all potential actions that could result in direct or indirect adverse effects on federally listed species. Therefore, we believe that the requirements of Section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. The obligations of the Corps must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

These constitute the comments of the U.S. Department of the Interior in accordance with the provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 *et seq.).*

Thank you for the opportunity to comment on this Study and potential impact to listed species. Please contact myself or Mr. Leroy Koch at 502-695-0468 with any question regarding these comments.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

cc: Doug Dawson, KDFWR, Frankfort, KY
Bobby Carson, MCNP, Mammoth Cave, KY
Nate Moulder, USACE, Louisville, KY

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

April 7, 2014

Ms. Sharon Bond
Chief, Planning Branch
Army Corps of Engineers, Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Ms. Bond:

On March 28, 2014, we provided the Corps with our Fish and Wildlife Coordination Act Report (Report) on the 2014 Green and Barren River Disposition Study (Study). In that Report, we identified some general issues and recommendations related to federally listed species and Endangered Species Act (ESA) compliance, but we did not provide specific recommendations on how we believe the Corps should achieve compliance with Section 7 of the Endangered Species Act (ESA) once a preferred alternative for disposing of Green River locks and dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 is identified. This letter contains our concurrence that the Corps' work to this point and preliminary selection of preferred alternatives for each of the facilities would not result in adverse effects on federally listed species and our recommendation for how future consultation on the disposition of these facilities should proceed.

Regarding the Corps' current ESA compliance responsibilities, we understand that the information provided in the Study is primarily of a planning nature and does not represent a specific project proposal that the Corps is prepared to implement. As a result, the information and recommendations we have provided should be considered technical assistance associated with our initial ESA informal consultation with the Corps on the disposition of these facilities. We do not believe that a Biological Assessment (BA) should be prepared at this time, because (a) we do not believe that any adverse effects on federally listed species can be tied to the Corps' preliminary selection of preferred alternatives for each of the facilities; and (b) the specific project actions that would be implemented at each of the facilities and any resulting effects on federally listed species cannot be accurately determined based on the information currently available. Therefore, we do not believe that it is necessary at this time for the Corps to provide the effects and jeopardy determinations associated with the consultation and conference provisions contained in ESA sections 7(a)(2) and 7(a)(4), respectively.

Our recommendation for future ESA consultation on the disposition of these facilities is for the Corps to prepare a BA, make its effects determinations for federally listed species in the action area, and continue informal consultation or initiate formal consultation with us after the planning document is complete and the Corps intends to implement its chosen alterative(s).

Based on our review of the Study and our discussions with Corps staff, we believe that removal of Green River Lock and Dam 6 may result in adverse effects on federally listed freshwater mussels and the Kentucky cave shrimp and that formal consultation may be necessary. Please notify us of the Corps' final plans for the disposition of these facilities.

The Green River watershed in Kentucky is a critical area for aquatic species conservation, and we appreciate the close coordination that the Corps has provided us on this Study. As we noted in our Report recommendations, we hope the Corps will consider removing all of the dams covered by the Study or disposing of the dams to agencies or organizations that would prioritize removal of the dams for conservation and river restoration purposes.

If you have any questions on the contents of this letter, please contact Leroy Koch of my staff at (502) 695-0468 (ext. 106).

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

cc: Doug Dawson, KDFWR, Frankfort, KY
Bobby Carson, MCNP, Mammoth Cave, KY
Nate Moulder, USACE, Louisville, KY

USFWS Fish and Wildlife Coordination Act Report dated 28 March 2014

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES

Steven L. Beshear
Governor

#1 Sportsman's Lane
Frankfort, Kentucky 40601
Phone (502) 564-3400
1-800-858-1549
Fax (502) 564-0506
fw.ky.gov

Bob Stewart
Secretary

March 28, 2014

Lee Andrews
US Fish and Wildlife Service
3761 Georgetown Road
Frankfort, KY 40601

RE: Draft Fish and Wildlife Coordination Act Report for the Draft Feasibility Report and Draft Environmental Assessment (EA) for the Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 Disposition Study

Dear Mr. Andrews:

We have reviewed the information provided in the Draft Fish and Wildlife Coordination Act Report for the Green River Locks and Dams 3, 4, 5, and 6 and the Barren River Lock and Dam 1 Disposition Study. We find the conclusions and recommendations outlined in the draft FWCA report acceptable and have no significant comments regarding the document at this stage of the review process.

We appreciate the opportunity to comment. Should you require any additional information, please contact me at 502/564-7109, ext. 4472.

Sincerely,

Doug Dawson

Doug Dawson
Environmental Section Supervisor

cc: Environmental Section Files

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

March 28, 2014

Ms. Sharon Bond
Chief, Planning Branch
Corps of Engineers, Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Ms. Bond:

Enclosed is a copy of the Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act Report regarding the Louisville District's 2014 Green and Barren River Disposition Study. This is the Service's official report as required by Section 2(b) of the Fish and Wildlife Coordination Act. Included is a concurrence letter from the Kentucky Department of Fish and Wildlife Resources. You may include our report in your Feasibility Report for the Green and Barren Rivers study.

Thank you for your concern for the protection of fish and wildlife resources in the Green and Barren Rivers. If you have any questions, please contact Leroy Koch of my staff at 502-695-0468, ext. 106.

Sincerely,

for Virgil Lee Andrews, Jr.
Field Supervisor

cc: Doug Dawson, KDFWR, Frankfort, KY
Bobby Carson, MCNP, Mammoth Cave, KY
Nate Moulder, USACE, Louisville, KY

Fish and Wildlife Coordination Act Report
for the
Draft Feasibility Report and Draft Environmental Assessment (EA)
for the Green River Locks and Dams 3, 4, 5, and 6 and
Barren River Lock and Dam 1 Disposition Study

Prepared by:
Lee Andrews and Leroy Koch
U.S Fish and Wildlife Service
Ecological Services Field Office
Frankfort, Kentucky

March 27, 2014

Introduction

In accordance with the National Transfer Funding Agreement and the Scope of Work agreed to by our respective agencies, the Fish and Wildlife Service (Service) is providing the following draft Fish and Wildlife Coordination Act Report for the Corps of Engineers – Louisville District's (Corps) investigation of alternatives for the disposition of decommissioned lock and dam facilities on the Green River and Barren River in Kentucky.

This draft report has been prepared and submitted under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), but does not constitute the final report of the Secretary of Interior as required by Section 2(b) of the Act. This draft report also addresses potential issues that may arise from the proposed disposition of these facilities pursuant to Section 7 of the Endangered Species Act.

Background

The Corps initiated a study on April 6, 1989, to determine the feasibility of restoring navigation on the Green River and Barren River from the confluence of the Green and Ohio rivers to Bowling Green, Kentucky. This study evaluated several multi-purpose lake alternatives with the primary objective of restoring navigation. The Fish and Wildlife Service (Service) submitted a preliminary planning aid report to the Corps in October 1989. The report identified fish and wildlife resources in the study area and the problems and needs associated with those resources, and provided a preliminary evaluation of potential impacts. A reconnaissance-level planning aid report was submitted to the Corps in March 1990, and the Corps' Reconnaissance Report was completed on March 30, 1990. This report identified one marginally feasible alternative – replacement of Green River Lock and Dam (L&D) 3 on the Green River. A supplemental reconnaissance planning aid report was completed by the Service and submitted to the Corps in March 1993. This report evaluated the potential impacts to fish and wildlife resources from construction of various types of navigation facilities. The 1989 study was initiated to make

decisions regarding the disposition of decommissioned navigation facilities on the Green River and Barren River.

All of the locks and dams upriver from Green River L&D 3 have been decommissioned and were, therefore, included in this study. The Service provided a Fish and Wildlife Coordination Act Report for the Green River Barren Rivers Disposition Study in June 1999. To the Service's knowledge, no action has been taken by the Corps to dispose of these facilities and/or remove any of the dams. The Corps has retained the facilities and associated properties in a caretaker status since then.

The Corps is again looking into the possible disposition of these facilities and has prepared an Environmental Assessment for the Disposition of Green River L&Ds 3, 4, 5, and 6 and Barren River L&D 1, dated January 2014. The following comments apply to the Corps' current assessment and proposed approach to dispose of the facilities. Much of the information in the Service's 1999 FWCA report is still relevant to the current Corps Feasibility of Disposition proposal. We have included some updates to the 1999 FWCA report below, and provided a summary of the Corps' current disposition alternatives in the Project Alternatives and Potential Impacts section. Further, we provide our current assessment of the Corps' proposed alternatives and our recommendations related to the disposition of these facilities in the Conclusions and Recommendations section below.

Study Area

The Green River originates in Lincoln County, Kentucky and flows in a southwesterly direction for approximately 31 miles where it then flows westerly for approximately 200 miles. From Rochester, Kentucky, the river flows 150 miles in a northwesterly direction to its confluence with the Ohio River near Evansville, Indiana at Ohio River Mile 784. The Green River watershed encompasses an area of 9,230 square miles and amounts to 23 percent of the drainage area of Kentucky. Elevations range from over 1,050 feet at the source to 337 feet (Ohio River pool elevation) at the mouth. The average river gradient is 1.9 feet per mile, and ranges from approximately four feet per mile in the headwater reach to 0.25 foot per mile near the confluence with the Ohio River.

Major tributaries from downstream to upstream are Panther Creek, Pond River, Rough River, Mud River, Barren River, and Nolin River. The Barren River, the largest tributary of the Green River, rises in Clay County, Tennessee, and Monroe County, Kentucky, and flows northwest for 158 miles where it joins the Green River at Green River Mile (GRM) 149.5. The Barren River watershed drains an area of 2,141 square miles and has an average gradient of 1.6 feet per mile.

The Green River basin includes all or part of 31 counties in Kentucky and three counties in Tennessee. However, for purposes of this report, the Fish and Wildlife Service will only consider project impacts on the Green and Barren Rivers in Butler, Edmonson, and Warren Counties.

Within the Corps' study area, the Green River and Barren River flow through the Low Plateau Province, which includes two physiographic regions. The Pennyroyal Region covers the central

and eastern portion of the drainage and is characterized by rolling limestone uplands and moderately wide floodplains. Numerous karst features and solution caverns formed by subsurface drainage are also common in this area. Gently rolling uplands and broad floodplains characterize the Western Coal Fields Region, which is located in the western part of the study area.

Approximately 95 percent of the Green River basin (including the Barren River drainage) is either cropland or forested habitat. Climate is of the humid, temperate type, with an average annual rainfall of 47 inches and a 180-day growing season. Agriculture is the primary, non-forest land use, and crops such as tobacco, corn, and wheat are grown primarily in the high quality soils on floodplain areas. Surface coal mining is the most extensive, non-agricultural industry in the basin and occurs primarily in the mid- to lower-portions of the basin. Surface coal mining is the typical method of coal extraction used in the major coal producing counties of this portion of the basin, but some underground mining activity is also conducted.

Forested habitats consist mainly of second-growth oak-hickory forest with ash, poplar, sugar maple, and elm as principal associate species. Large scale clearing has destroyed most of the virgin forest, but small tracts containing near-original vegetation may still exist on isolated private and public lands, such as Mammoth Cave National Park. The lower portion of the study area contains numerous forested, emergent, and scrub-scrub wetlands. "Swamp" species that are more-typical of southern wetland types have extended their ranges from the Mississippi alluvial valley into the lower Green River and its tributaries. Black willow, bald cypress, swamp and eastern cottonwood, pin oak, river birch, and silver maple may occur in the wetlands in the western portion of the study area. These species become less abundant or disappear in the central and upper parts of the basin.

The Green River, a major tributary to the Ohio River, and the Barren River has been used for commercial navigation purposes since the mid 1700's. The first navigation structures were constructed in the 1830's and additional structures have been constructed periodically since that time. Each navigation project was constructed to establish and maintain a minimum six-foot navigation channel. Original navigation facilities on the lower reach of the Green River at Green River Lock and Dam (L&D) 1 and Green River L&D 2 were built in the mid- to late-1800's; new navigation locks were completed and placed in operation in 1956. Green River L&D 3 and Green River L&D 4 were constructed in the mid-1800's; however, Green River Dam 4 was breached in 1965, and, consequently, the facility was closed to barge traffic. Green River L&D 5 and Green River L&D 6 were built in the early 1900's, and both were deactivated in 1951. Barren River L&D 1 was built in 1841. A new lock was completed in 1934, but this facility was closed to navigation when Green River L&D 4 was breached. Currently, navigation traffic is restricted to the lower reach of the Green River upriver to Green River L&D 3 at the town of Rochester, Kentucky.

The system of navigation locks and dams on the Green River has essentially created lentic conditions from the river's mouth to GRM 199. Substrate in the pooled reaches consists primarily of boulders, rubble, and bedrock overlain with silt, sand, and organic materials. Green River L&Ds 1 and 2 impound approximately 190 miles of the lower Green River, and have especially deep accumulations of bottom sediments that are frequently redistributed by barge

tows and high seasonal river flows. The pool created by Green River L&D 3 extends 41 miles upriver and also contains significant sediment deposits. Green River L&D 4 once maintained a pool 22 miles long; however, in 1965 the dam was breached and free-flowing conditions and riffles have been reestablished. Green River L&Ds 5 and 6 impound 13 miles and 17 miles of the Green River, respectively, with the pool at Green River L&D 6 extending approximately 17 miles up the Green River into Mammoth Cave National Park (MCNP) and 7 miles up the Nolin River. Barren River L&D 1 impounds approximately 15 miles of the river up to the City of Bowling Green, Kentucky.

There are several State-owned conservation and/or recreation areas located in the Green River basin, including Green River State Forest (Henderson County), Lake Malone State Park (Muhlenberg County), and several Wildlife Management Areas operated by the Kentucky Department of Fish and Wildlife Resources, among others. Within the study area, the Green River from Green River L&D 6 to Dennison Ferry at GRM 204.9 is a state-designated Wild River Area. The largest recreation area, by far, is the 52,830-acre MCNP. The park is primarily woodland and contains more than 200 miles of underground passages and chambers that are part of the world's longest known network of natural caves. In addition, a number of privately-owned and municipal recreation areas and public boat launching ramps are located throughout the study area.

Existing Fish and Wildlife Resources

The land and water resources in the Green River and Barren River basins provide habitat for a variety of fish and wildlife populations which generate numerous opportunities for both consumptive and non-consumptive recreational uses. Habitat quality is variable, however, and depends on adjacent and upstream land uses and other factors. River-oriented recreation can be limited, because (a) steep river banks can significantly restrict access for fishing and other recreational uses, (b) turbid waters, especially in the lower portions of the Green River watershed, can deter fishing, swimming, and other water-contact activities, and (c) adjacent land ownership is largely private, thus limiting the potential for public access. Collectively, all of these factors contribute to a general low use of most of the Green and Barren rivers. Higher use of the Green River occurs between the Green River Dam (Taylor County, Kentucky) and MCNP due to increased access availability and public recreation opportunities associated with MCNP. In spite of this, future increases in demand for recreational and developmental uses within these basins will result in more frequent conflicts over, and great competition for, these limited resources.

In general, the banks of the Green River support riparian vegetation which provides cover for fish and wildlife, maintains stable water temperatures, acts as a source of detritus for the aquatic system, aids in prevention of shoreline erosion, and acts as a buffer zone between the upland and the river. This riparian zone and adjacent forest land varies from approximately thirty feet to several thousands of feet in width. Although forested areas along the Green River and Barren River have undergone varying degrees of disturbance, few developments in the area have resulted in complete removal of riparian vegetation.

Prior to construction of the navigation lock and dam system, free-flowing conditions comprised of distinct habitat types probably existed in the Green River and Barren River. These habitats historically supported approximately 151 species of native fishes, making the fish faunas in these rivers among the most diverse in the United States. Free-flowing river reaches above GRM 199 presently contain diverse biotic communities and support populations of such species as smallmouth bass, darters, madtoms, sculpins, and other coolwater species. High quality riffle areas with sand and gravel substrate also contain a rich freshwater mussel fauna. Completion of the locks and dams altered riverine habitat by reducing flows, eliminating shoals and riffles, altering substrate composition from sand and gravel to finer sediments, and changing the rivers from free-flowing coolwater streams to slow-flowing warmwater streams. These changes in habitat type also resulted in species composition changes. Coolwater species were replaced by warmwater species such as largemouth bass, catfish, and bluegill. However, coolwater fisheries still exist in the river reaches above the impounded pools (i.e., above GRM 199 and above Bowling Green). This shift in habitat conditions has also resulted in increasing population levels of carp, gar, and shad and of some commercially important species, such as buffalo, redhorse, and freshwater drum.

Important sportfish species which occur in the Green River and Barren River include largemouth, spotted, and smallmouth bass; bluegill; white and black crappie; channel catfish; longear, redear, and green sunfish; walleye; rock bass; sauger; white bass; and striped bass. There are also naturally-occurring populations of Ohio muskellunge in the Green River and in the lower Barren River and Nolin River. Habitat for the muskellunge has diminished in Kentucky due to development, impoundment, and pollution, but the Green River and Barren River still support good populations of this game species. Until recently, the tailwaters of the Green River and Barren River Reservoirs have been stocked with rainbow trout to provide additional sport fishing opportunities. Although this fishery likely no longer exists, rainbow trout have been observed in subterranean waters in the Mammoth Cave system.

Construction of the navigation system on the Green River and Barren River has reduced the quantity and quality of freshwater mussel habitat. Many shoals with clean sand and gravel substrate have been replaced by slow-flowing, silt-bottomed pools. Currently, favorable habitat for remnant populations of the original mussel fauna generally exists immediately below the locks and dams and upstream from the Green River reach impounded by Green River L&D 6. Historically, the Green River mussel fauna was comprised of more than 70 species.

The Green River from Munfordville to the upper reaches of pool six still supports the most diverse and abundant mussel community in the Green River basin; approximately 57 species are presently known to occur in this portion of the river. Surveys conducted in 1987 and 1988 yielded 40 species in the Green River from Green River L&D 4 to Munfordville, Kentucky. Thirty species were collected in the lower Barren River, including two endangered species. Limited surveys above Barren River L&D 1 produced few live mussels; however, a survey conducted in 1990 revealed the presence of one endangered mussel species in the Barren River in the reach between Bowling Green and Barren River Lake. Because intensive surveys have not been conducted, the mussel faunas of most of the Green River's tributaries remain largely undescribed. However, mussels still persist, likely in reduced numbers, in the Pond, Mud,

Rough, and Nolin Rivers. These populations have been and continue to be impacted by development and pollution.

The rivers in the study area, their associated riparian habitats, and adjacent lands provide high quality habitat for a variety of wildlife species. These habitats support populations of well over 200 species of birds. Important game species include bobwhite quail, mourning dove, woodcock, and turkey. The area also provides winter habitat for waterfowl species such as mallard, black duck, scaup, pintail, gadwall, and American goldeneye. In addition, wood ducks occur as residents during the summer and nest in the area. Common non-game species inhabiting the area include the eastern bluebird, red-tailed hawk, cardinal, blue jay, barred owl, downy woodpecker, Carolina wren, and numerous other forest and open-land species.

There is a diverse mammalian fauna in the study area. Eastern cottontail, gray and fox squirrels, white-tailed deer, raccoon, woodchuck, and opossum are common game species. Numerous karst features in the study area provide habitat for cave-dwelling species, such as the big brown bat, little brown bat, eastern pipistrelle, Northern long-eared bat (which has been proposed for federal listing as an endangered species), and two endangered bat species – the gray bat and Indiana bat. Furbearers also occur in the area; important species include muskrat, mink, longtail weasel, striped and spotted skunk, beaver, raccoon, red fox, and gray fox.

Reptile and amphibian populations occur throughout the study area. Species composition is considered diverse due to the variety of habitat types that exist in the area. Common species include the spotted salamander, green frog, snapping turtle, eastern box turtle, ringneck snake, eastern hognose snake, and northern water snake.

The Green River and Barren River drainages contain abundant cave and karst features. These subterranean habitats contain unique species including one species of cave crayfish which is endemic to the Mammoth Cave area. Three species of cave shrimp, including one endemic species, and three endemic cave beetles, along with numerous other invertebrate species (e.g., insects, millipedes, etc.) also inhabit subterranean habitats in the study area.

Federally-Listed Species

Although portions of the study area provide high quality habitats and contain diverse and abundant populations of many fish and wildlife species, there are species that occur in the study area that are rare and some have been federally listed as either threatened or endangered due to threats such as the destruction of alteration of their habitats.

The Kentucky cave shrimp is endemic to the Mammoth Cave system. Populations of this rare species are thought to have been reduced by the impoundment of the Green River. Critical habitat has been designated for the species and includes the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of MCNP.

Caves in the study area also provide habitat for the endangered gray bat and Indiana bat and for the Northern long-eared bat that has been proposed for federal listing under the Endangered Species Act. These caves are used primarily as hibernacula by these species, but there is at least one cave within the study area known to support a gray bat maternity colony. Future surveys in

the study area may reveal the presence of other gray bat maternity caves. In addition, several Indiana bat and Northern long-eared bat maternity colonies have been discovered in and near MCNP where they utilize hardwood forests and riparian areas for rearing of young, roosting, and foraging. Other, similar habitats in the study area may support additional maternity colonies of these species.

The study area is, or was historically, used by a number of federally listed species of birds. The rivers and reservoirs in the Green River basin provide suitable habitat for wintering populations of the bald eagle and may also be used for nesting. Nesting by bald eagles has been confirmed in areas to the west of the study area and on MCNP lands. Although no recent nesting has been reported, the American peregrine falcon occurs as a migrant or transient in the study area. Kirtland's warbler is also a transient in central Kentucky during its spring migration.

The Green River provides habitat for freshwater mussels, including populations of the following endangered species: rough pigtoe (*Pleurobema plenum*), pink mucket (*Lampsilis abrupta*), spectaclecase (*Cumberlandia monodonta*), sheepnose (*Plethobasus cyphyus*), rabbitsfoot (*Quadrula cylindrica cylindrica*), ring pink (*Obovaria retusa*), and fanshell (*Cyprogenia stegaria*). These species are known to occur, or are likely to occur, in river sections from Pool 6 downstream to Pool 3. The pink mucket and rough pigtoe have been collected recently in the Barren River.

Open woods and woodland edge habitats where limestone bluffs grade into river bottoms may support populations of Price's potato bean (*Apios priceana*), a federally threatened plant species.

Proposed critical habitat for the rabbitsfoot mussel extends from the Maple Springs Ranger Station road upstream to Green River dam, a distance of 109.1 miles. The diamond darter (Crystallaria cincotta) has critical habitat designated from the lower end of Cave Island (GRM 200.3) upstream to Roachville Ford (GRM 294.8). Critical habitat for the Kentucky Cave shrimp is the Roaring River passageway.

The Green River and Barren River study area also provides habitat for a number of rare species that are potential Federal candidates for listing. Terrestrial or aquatic habitats in the study area may support populations of the southeastern bat, Rafinesque's big-eared bat, small-footed bat, eastern small-footed bat, eastern woodrat, Bachman's sparrow, eastern sand darter, northern cave fish, southern cavefish, longhead darter, blue sucker, hellbender, Kirtland's water snake, copperbelly water snake, Kentucky creekshell (mussel), purple lilliput pearly mussel, false foxglove, pale false foxglove, royal catchfly, and Gattinger's lobelia. None of these species are currently considered to be candidate species; however, they could be elevated to such status and listed in the future if their numbers decline and threats to their survival continue.

Project Alternatives and Potential Impacts

The proposed actions under study involve disposition of one or more of the former navigation facilities on the Green River and Barren River (Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1). The alternatives proposed by the Corps include:

Alternative 1 (No Action): A 'no action' alternative would mean that the Federal government would retain ownership and responsibility for the properties. No alterations would be done to the facilities. The Louisville District would continue in caretaker status, maintaining "No Trespassing" signage and periodically inspecting the properties.

Regarding potential impacts, the Service believes that under this alternative, there would be no change and/or the impacts would be similar to those that have been occurring in recent years.

Alternative 2: With this alternative, the properties would be disposed of without any permanent alterations to the lock and dam structures. The Louisville District would remain responsible for the properties up to the point at which the ownership is transferred. Any action necessary to complete the real estate transfer would be included, but no construction is included in this alternative.

Regarding potential impacts, the Service believes that under this alternative the impacts would likely be of a minor nature to water quality, shoreline vegetation and banks, aquatic species, and instream habitat.

Alternative 3 (Disposal of Federal Ownership after Dam Removal and Lock Stabilization): With this alternative the dams would be removed and the locks would be stabilized before disposal. After the dam removal is accomplished, the property would be disposed through normal GSA and Corps of Engineers procedures. However, the Louisville District is only proposing Alternative 3 to be applied to Green River Dam #6. Reasons provided for excluding Green River Locks and Dams 3 and 5 are that removal would adversely affect municipal water supply intakes. Barren River Dam No. 1 was excluded because of anticipated water supply needs to the City of Bowling Green.

Regarding potential impacts for this preferred alternative, the Service believes that impacts could be significant, especially for water quality, shoreline vegetation and banks, aquatic fauna, and instream habitat.

Alternative 4 (Disposal of Federal Ownership after Lock Modification): With this alternative the locks would be modified before disposal (stabilized with rip rap and or concrete plug), but the dams would be left undisturbed.

Regarding potential impacts for this alternative, the Service believe that the impacts could be of a minor nature or moderate nature, depending on the type of activity utilized in the stabilization of the locks.

Louisville District Preferred Alternatives
The Louisville District selected Alternative 3 as their preferred alternative for Green River Lock and Dam 6.

The Louisville District selected Alternative 2 as the preferred alternative for Green River Locks and Dams 3, 4, and 5 and Barren River Lock and Dam 1.

Conclusions and Recommendations

1. The Service supports the Corps' selection of Alternative No. 3 for the removal of Green River Lock and Dam 6. Removal of Lock and Dam 6 on the Green River would potentially restore free-flowing conditions to approximately 17 miles of the Green River that flows through MCNP, about 7 miles of the lower Nolin River, and subterranean waters within MCNP. It is our understanding that Green River L&D 6 has the potential to experience uncontrolled failure if it is left in its current condition. If this happens, the aquatic fauna and habitat present upstream and for a distance downstream of Green River L&D 6, along with existing water withdrawal structures in Pool 5, may experience significant negative impacts (e.g., sediment release and subsequent deposition, physical damage to facilities or lands). Conversely, if this dam removal is accomplished carefully and in an appropriate manner so as to reduce negative impacts to the aquatic resources, the Green River upstream of Green River L&D 6 would be restored to a free-flowing condition. This would facilitate the natural re-colonization of that reach by native riverine fauna and avoid the unintended impacts to downstream facilities and lands.

   The Service recommends that the Corps grant the remaining property and structures to a suitable, qualified conservation organization that would ensure public access to the site after Green River L&D 6 is removed. MCNP would be a suitable organization for the portion of the Corps' facility on the south (or east) side of the Green River, because MCNP already borders that portion of the facility, and we would hope that MCNP would be willing to accept the entire facility.

2. The Service asks that the Corps reconsider its selection of Alternative 2 for Green River Locks and Dams 3, 4 and 5 and Barren River L&D 1. Although this approach relieves the Corps of future management responsibilities and costs at these facilities, the application of this alternative at these four facilities does not provide any assurances that disposition of these facilities will benefit fish and wildlife resources. To the contrary, we believe it will promote maintenance of these facilities which have historically resulted in significant impacts to the Green River system and continue to limit the quality of aquatic habitat and resources in the watershed. We strongly urge the Corps to utilize Alternative 3 for all of the facilities, as this would provide a significant and unique opportunity to undertake a major river restoration effort that has never been attempted in Kentucky or within the Louisville District. Restoring these river reaches to a free-flowing condition would provide the greatest benefit to aquatic and riparian resources in these watersheds. If all of these dams were removed, then approximately 94 miles of the Green River, approximately 15 miles of the Barren River, and approximately 7 miles of the Nolin River would be largely restored to their pre-navigation conditions.

3. In addition to the benefits that would be attained through the removal of Green River L&D 6, we encourage the Corps to evaluate the potential to implement other habitat protection and restoration options and/or projects in the study area. Such efforts would be important to the continued existence of the federally-listed mussel species that are present in the Green River and Barren River and for the Kentucky cave shrimp. For example, if removal of Green River L&D 5 was not pursued, we recommend the Corps

evaluate the need for modification of that facility to ensure that backwater from the facility does not impact the subterranean habitat of the Kentucky cave shrimp or restored mussel habitat above the current location of Green River L&D 6 within MCNP (i.e., assuming that facility has been removed).

4. Potential future owners of the facilities are unknown at this time and are unlikely to undertake actions that would improve conditions for fish and wildlife resources at the facilities. Future, non-conservation owners could further impact fish and wildlife resources if the future management objectives of the owners do not promote aquatic resource conservation. Therefore, we recommend that the Corps work with the Service, MCNP, and other organizations involved in conservation of the Green River (e.g., The Nature Conservancy) to evaluate and develop disposition plans that maximize benefits to resources in the watershed.

5. The Service recommends that the Corps evaluate and propose options that would address the issue of municipal water supply. Technological and engineering advances have provided alternatives to ensure municipal water supplies that do not require the maintenance of dams and the associated long-term costs of impoundments. For example, the City of Greensburg, Kentucky, intends to replace its existing water intake structure with a different structure that would ensure water supplies even during low flow conditions in an unimpounded portion of the upper Green River. We recommend that the Corps assist local communities and water authorities to develop alternatives that would make retention of the dams and associated impoundments unnecessary.

6. We recommend the Corps determine if Green River L&D 5 is likely to impact a portion of the reach upstream of Green River L&D 6 even if Green River L&D 6 is removed. If so, the estimated length of free-flowing river upstream of Green River L&D 6 may be over-estimated in the feasibility study, and we recommend that the Corps consider modifying Green River L&D 5 in order to prevent future pool influences in the restored reach above Green River L&D 6.

7. The January 2014 Environmental Assessment contains a limited amount of new biological information on the Green River system and, in some instances, has information that is no longer correct. For example, additional surveys have been conducted in the past ten years on freshwater mussels in the Green River and lower Barren River that would be pertinent to this feasibility study. The sheepnose (*Plethobasus cyphyus*), spectaclecase (*Cumberlandia monodonta*), and rabbitsfoot (*Quadrula cylindrica cylindrica*) have recently been added to the federal list of endangered and/or threatened mussels. In addition, critical habitat has been listed for the Kentucky cave shrimp which includes Roaring River passageway; and, proposed critical habitat for the rabbitsfoot mussel extends from Maple Springs Ranger Station Road upstream to Green River dam. Also, critical habitat has been designated for the diamond darter (Crystallaria cincotta) from the lower end of cave island (GRM200.3) upstream to Roachville Ford (GRM 294.8). A viable population of the spectaclecase mussel is now known to occur in about an approximately 10-mile reach of the Green River upstream of the confluence with the Barren River but below Green River L&D 5. Additional surveys of mussels have

documented a diverse (i.e., 30+ species) in this same reach of the Green River, and other surveys have shown that freshwater mussels occur with some diversity further downstream into the area below Green River L&D 4.

8. A statement on page 26 of the EA, indicates that certain species (e.g., orangefoot pearly mussel, purple catspaw, northern riffleshell) mussels are still present and/or reproducing in the Green River, is not likely correct since there is no recent evidence of these species existing in the Green River. Recent records of listed mussels and associated mussel fauna in this portion of the Green River watershed are far from complete; however, additional mussel surveys are necessary throughout this reach and are needed to provide a more-accurate assessment of the mussel fauna, including federally listed species. For example, the recently-discovered spectaclecase population in the Green River is one of only three viable populations known of this species east of the Mississippi River. Also, the ring pink is only known from the Green River with the last known individual observed in Pool 4 in 2013. Even though the Environmental Assessment is not completely accurate regarding the conservation status of freshwater mussels in the basin, it is sufficient to highlight the tremendous aquatic diversity that occurs in the portion of the Green River and Barren River as pertains to the Corps' disposition study. The Service recommends that the disposition study include a statement that listed mussels are known to occur at many, various locations is the study area and that federally listed mussels are likely to occur at any location where suitable habitat conditions exist.

9. The Service believes that federally listed species may be adversely affected by some of the specific facility disposition activities identified in the Corps' study. While the Corps' administrative action of disposing of the facilities is unlikely to have direct adverse effects, the implementation of the Corps' preferred alternatives at each of the facilities could have directly and/or indirect adverse effects on federally-listed species. In particular, we believe that implementation of the Corps' preferred alternatives at the facilities may result in the following adverse effects:

    a) Federally-listed freshwater mussels could be adversely affected by dewatering of habitat areas upstream of Green River L&D 6, release and downstream movement of sediment both upstream and downstream of Green River L&D 6, releases of contaminated sediments (if present), and alterations of normal behavior patterns and fish host availability as areas within the reach above Green River L&D 6 transition from a near-lentic habitat condition to a lotic (riverine) condition. This contradicts the Corps' contention that implementation of Alternate 3 at Green River L&D 6 is not likely to adversely affect federally-listed species.

    b) If land disturbances or tree clearing are necessary to undertake any of the actions associated with the preferred alternatives at the facilities, the Corps' proposed action could result in adverse effects on bat species that are federally-listed (i.e., Indiana bat, gray bat) or have been proposed for listing (i.e., Northern long-eared bat). Such effects could result from degradation or loss of forested roosting and foraging habitat or harassment due to disturbances during construction activities.

c) The endangered Kentucky cave shrimp may be adversely affected by the proposed removal of Green River L&D 6 due to changes in subterranean flows or sediment movement. In addition, the retention of Green River L&D 5 may result in similar effects after Green River L&D 5 is removed.

d) The Service believes that surveys for federally-listed species may need to be conducted to determine if species occur in the vicinity of the facilities and that a Biological Assessment (BA) may need to be prepared for any particular action that the Corps may implement. In particular, the removal of Green River L&D 6 is likely to require the development of a BA to address potential adverse effects on federally listed mussels and the Kentucky cave shrimp, including addressing critical habitat issues on the Kentucky cave shrimp, rabbitsfoot mussel and diamond darter. The Service believes that removal of Green River L&D 6 will likely benefit the Kentucky cave shrimp, federally-listed freshwater mussels, and the gray bat in the long-term, even though short-term adverse effects and incidental take make occur as the result from the dam removal.

The Service recommends the Corps include the following factors and analysis, plus any other relevant information that would be pertinent to the proposed action, in the BA:

i. A thorough examination should be made of accumulated sediments upstream of the dam to determine the level of contaminants present, if any. If significant levels of contaminants are detected, the Corps should consider manually removing the contaminated sediment to an approved upland disposal site.
ii. Determine the appropriate method and removal of the dam to control the release of sediments downstream so that negative impacts to the aquatic fauna and downstream facilities and lands are avoided and/or minimized.
iii. Evaluate, in detail, all potential impacts to fish and wildlife resources resulting from implementation of the dam removal. Include impacts from sedimentation, reduced water levels in the pools, dewatering of aquatic habitats, and any other changes that may result from dam removal. Measures should be developed and included in the BA to avoid or minimize to the greatest extent possible adverse effects on federally-listed species.

10. If the Corps decides to move forward with disposition of these dams and associated properties as proposed, the Service is very interested in exploring the possibility of either taking possession of them or working with the Corps to identify a suitable conservation owner for the sites. We will discuss this option within our agency and with other federal agencies that might have an interest in the facilities and will include the Corps in those discussions.

USFWS Fish and Wildlife Coordination Act Report dated June 1999

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

July 14, 1999

Colonel Harry L. Spear, Jr.
District Engineer
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Re: Green and Barren Rivers Disposition Study

Attention: Ms. Jane Ruhl, P.E., Project Manager

Dear Colonel Spear:

Enclosed is a copy of the Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act Report regarding the Louisville District's Green and Barren Rivers Disposition Study. This is the Service's official report as required by Section 2(b) of the Fish and Wildlife Coordination Act, and contains a concurrence letter from the Director of the Kentucky Department of Fish and Wildlife Resources. You may include our report in your Feasibility Report for the Green and Barren Rivers study.

Thank you for your assistance. Your concern for the protection of fish and wildlife resources in the Green River and Barren River is greatly appreciated. If you have any questions, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

Enclosure

FISH & WILDLIFE COMMISSION
Mike Boatwright, Paducah
Tom Baker, Bowling Green
Allen K. Gailor, Louisville
arles E. Bale, Hodgenville
James R. Rich, Taylor Mill
n Frank Brown, Richmond
Doug Hensley, Hazard
Dr. Robert C. Webb, Grayson
David H.Godby, Somerset

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF FISH AND WILDLIFE RESOURCES
C. THOMAS BENNETT, COMMISSIONER

June 23, 1999

Dr. Lee A. Barclay
US Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501

RE: Fish and Wildlife Coordination Act Report for the Green and Barren Rivers Disposition Study, Louisville District Corps of Engineers.

Dear Dr. Barclay:

Members of my staff have reviewed the above-referenced report. Accordingly, we offer the following comments and recommendations.

The concern the Kentucky Department of Fish and Wildlife Resources (KDFWR) has with the proposed project is the impact any of the alternative on endangered species and freshwater mussel resources. The removal of the structures, especially Lock and Dam No. 6, will drastically alter water levels upstream of the action and may negatively impact these species. The Kentucky Cave Shrimp (*Palaemonias ganteri*), while impacted by sediment deposits, has begun to recover with the existing pool levels. How will this species be impacted by reduced pool levels, which may reduce available habitat and increase competition? Freshwater mussels now exist in sections of the river which have higher levels of water because of the locks and dams. If water levels are reduced, will areas that now harbor freshwater mussels be de-watered resulting in mortality to this resource? Again, this could impact federally listed endangered species of freshwater mussels.

KDFWR supports the re-establishment of the natural condition of the river but we are concerned that resources that are now endangered may depend upon the existing structures for their continued existence.

We appreciate the opportunity to comment. Members of my staff available should you or any of your staff have any questions regarding our comments.

Sincerely,

C. Tom Bennett
Commissioner

CTB/WLD/kh

Cc: Peter W. Pfeiffer, Director, Division of Fisheries
Edwin F. Crowell, Asst. Director, Division of Fisheries
Bonny Dale Laflin, Southwestern Fishery District Biologist
David E. Bell, Northwestern Fishery District Biologist
Environmental Section Files

EDUCATION PAYS

Fish and Wildlife Coordination Act Report for the Green and Barren Rivers Disposition Study

Prepared by:

James C. Widlak
Ecological Services Field Office
Cookeville, Tennessee

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

June, 1999

Introduction

In accordance with the National Transfer Funding Agreement and the Scope of Work agreed to by our respective agencies, the Fish and Wildlife Service (Service) is providing the following draft Fish and Wildlife Coordination Act Report in regard to the Louisville District, Corps of Engineers' (Corps) investigation of alternatives for the disposition of decommissioned lock and dam facilities on the Green River and Barren River in Kentucky.

This draft report has been prepared and submitted under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), but does not constitute the final report of the Secretary of Interior as required by Section 2(b) of the Act. This draft report also addresses issues regarding Section 7 of the Endangered Species Act.

The Corps of Engineers initiated a study on April 6, 1989, to determine the feasibility of restoring navigation on the Green River and Barren River from the Ohio River to Bowling Green. This study evaluated several multi-purpose lake alternatives with the primary objective of restoring navigation. The Fish and Wildlife Service submitted a preliminary planning aid report to the Corps in October 1989. The report identified fish and wildlife resources in the study area and the problems and needs associated with those resources, and provided a preliminary evaluation of potential impacts. A reconnaissance-level planning aid report was submitted to the Corps in March 1990, and the Corps' Reconnaissance Report was completed on March 30, 1990. This report identified one marginally feasible alternative--replacement of Lock and Dam 3 on the Green River. A supplemental reconnaissance planning aid report was completed by the Fish and Wildlife Service and submitted to the Corps in March 1993. This report evaluated the potential impacts to fish and wildlife resources from construction of various types of navigation facilities. The current study has been initiated to make decisions regarding the disposition of decommissioned navigation facilities on the Green River and Barren River. All of the locks and dams upriver from Lock and Dam 3 have been decommissioned and are therefore included in this study.

Study Area

The Green River originates in Lincoln County, Kentucky, and flows in a southwesterly direction for approximately 31 miles to the town of Dunnsville. The river then turns and flows westward for 200 miles. From Rochester, Kentucky, the river flows 150 miles in a northwesterly direction to its confluence with the Ohio River near Evansville, Indiana (ORM 784). The Green River watershed encompasses an area of 9,230 square miles and amounts to 23 percent of the drainage area of the State. Elevations range from over 1,050 feet at the source to 337 feet (Ohio River pool elevation) at the mouth. The average river gradient is 1.9 feet per mile, and ranges from approximately four feet per mile in the headwater reach to 0.25 foot per mile near the confluence with the Ohio River.

Major tributaries from downstream to upstream are Panther Creek, Pond River, Rough River, Mud River, Barren River, and Nolin River. The Barren River, the largest tributary of the Green River, rises in Clay County, Tennessee, and Monroe County, Kentucky, and flows northwest for 158 miles where it joins the Green River (GRM 149.5). It drains an area of 2,141 square miles and has an average gradient of 1.6 feet per mile.

The Green River basin includes all or part of 31 counties in Kentucky and three counties in Tennessee (Figure 1). However, for purposes of this report, the Fish and Wildlife Service will only consider project impacts on the Green and Barren Rivers in Butler, Edmonson, and Warren Counties (Figure 2).

The Green River and Barren River in the study area flow through the Low Plateau Province, which includes two physiographic regions. The Pennyroyal Region covers the central and eastern portion of the drainage, and is characterized by rolling limestone uplands and moderately wide floodplains. Numerous karst features and solution caverns formed by subsurface drainage are also common in this area. Gently rolling uplands and broad floodplains characterize the Western Coal Fields Region, which is located in the western part of the study area.

Approximately 95 percent of the Green River basin (including the Barren River drainage) is either cropland or forested habitat. Climate is of the humid, temperate type, with an average annual rainfall of 47 inches and a 180-day growing season. Crops such as tobacco, corn, and wheat are grown primarily in the high quality soils on floodplain areas. Forested habitats consist mainly of secondary oak-hickory forest with ash, poplar, sugar maple, and elm as principal associate species. Large scale clearing has destroyed most of the virgin forest, but small tracts containing near-original vegetation may still exist on public lands such as Mammoth Cave National Park. The lower portion of the study area contains numerous forested, emergent, and scrub-shrub wetlands.

Typical southern "swamp" species have extended their ranges from the Mississippi alluvial valley into the lower Green River and its tributaries. Black willow, bald cypress, swamp and eastern cottonwood, pin oak, river birch, and silver maple may occur in the wetlands in the western portion of the study area. These species become less abundant or disappear in the central and upper parts of the basin, but tracts of bottomland hardwood still occur along the rivers and tributaries throughout the upper reaches of the study area.

Mineral resources in the Green River and Barren River drainages include coal, oil, gas, sand, gravel, limestone, and asphalt rock. An estimated 33 percent of coal production in Kentucky occurs in the Green River basin. Surface mining is the most common method of coal extraction in the major coal producing counties, but some underground mining activity is conducted.

The Green River, a major tributary to the Ohio River, and the Barren River have been used for commercial navigation purposes since the mid-1700's. The first navigation structures were constructed in the 1830's and additional structures have been constructed periodically since that time. Each navigation project was constructed to establish and maintain a minimum six-foot navigation

Figure 1. Green River Drainage

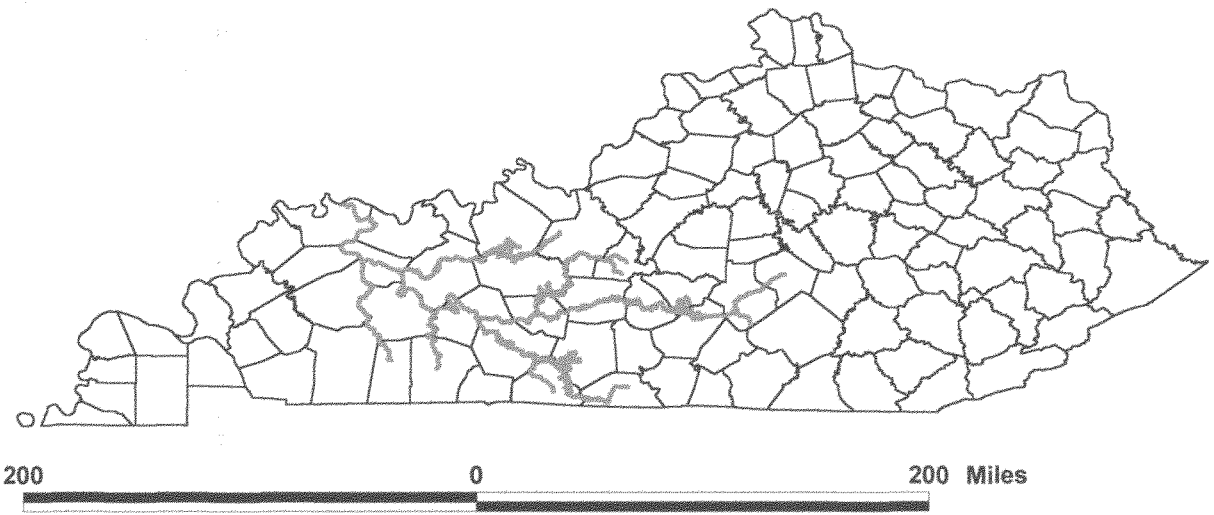
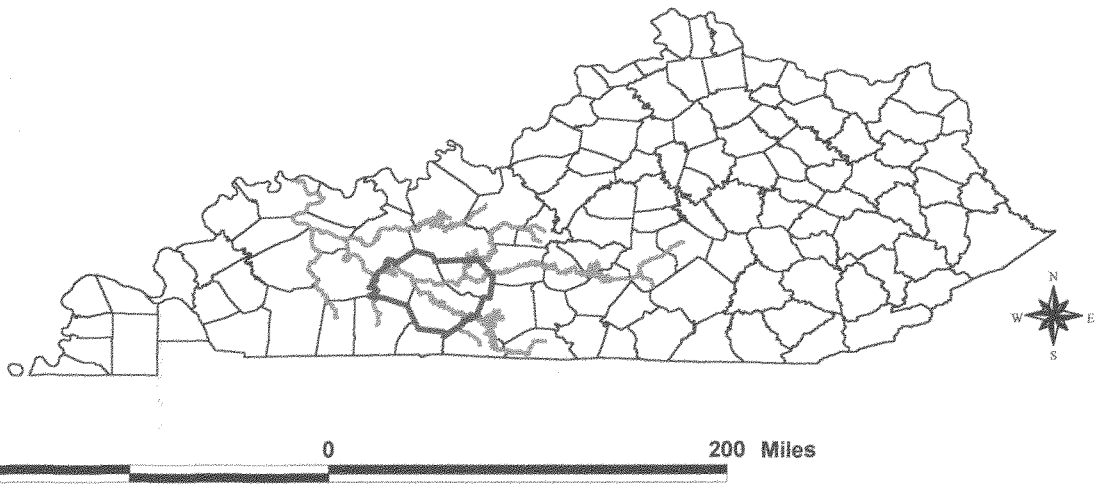


Figure 2. Green and Barren Rivers Disposition Study Area



channel. Original navigation facilities on the lower reach of the Green River (i.e., locks and dams 1 and 2) were built in the mid- to late 1800's; new navigation locks were completed and placed in operation in 1956. Locks and dams 3 and 4 were constructed in the mid-1800's; dam 4 was breached in 1965 and consequently closed to barge traffic. The upper navigation facilities on the Green River (i.e., locks and dams 5 and 6) were built in the early 1900's; both were deactivated in 1951. Barren River Lock and Dam 1 was built in 1841. A new lock was completed in 1934, but this facility was closed to navigation when Green River Lock and Dam 4 was breached. Currently, navigation traffic is restricted to the lower reach of the Green River upriver to Lock and Dam 3 at the town of Rochester.

The system of navigation locks and dams on the Green River have essentially created lentic conditions from the river's mouth to Mile 199. Substrate in the pooled reaches consists primarily of boulders, rubble, and bedrock overlain with silt, sand, and organic materials. Locks and Dams 1 and 2 impound approximately 109 miles of the lower Green River, and have especially deep accumulations of bottom sediments that are frequently redistributed by barge tows and high seasonal river flows. The pool created by Lock and Dam 3 extends 41 miles upriver and also contains significant sediment deposits. Lock and Dam 4 once maintained a pool 22 miles long; however, in 1965 the dam was breached and free-flowing conditions and riffles have become reestablished. Locks and Dams 5 and 6 impound 13 miles and 17 miles of the Green River, respectively; pool 6 extends approximately 17 miles up the Green River into Mammoth Cave National Park plus 7 miles up the Nolin River. Barren River Lock and Dam 1 impounds approximately 15 miles of the river up to the city of Bowling Green.

State recreation areas located in the Green River basin include John James Audubon State Park (Henderson County), Lake Malone State Park (Muhlenberg County), and the L.B. Danison Wildlife Management Area (Ohio County). Within the study area, the Green River from Lock and Dam 6 to Dennison Ferry at Mile 204.9 is a state-designated Wild River Area. The largest recreation area, by far, is the 52,830-acre Mammoth Cave National Park. The park is primarily woodland and contains more than 200 miles of underground passages and chambers which are part of the world's longest known network of natural caves. In addition, a number of privately-owned and municipal recreation areas and public boat launching ramps are located throughout the study area.

Existing Fish and Wildlife Resources

The land and water resources in the Green River and Barren River basins provide excellent habitat for a variety of fish and wildlife populations which generate numerous opportunities for both consumptive and non-consumptive recreational uses. However, river-oriented recreation is limited; steep banks significantly restrict bank fishing; turbid waters deter fishing, swimming, and other water-contact activities; and large tracts of privately owned land that limit public access all

contribute to low use of the Green River and Barren River. In spite of this, future increases in demand for recreational and developmental uses within these basins will result in more frequent conflicts over, and greater competition for, these limited resources.

In general, the banks of the Green River support riparian vegetation which provides excellent cover for fish and wildlife, maintains stable water temperatures, acts as a source of detritus for the aquatic system, aids in prevention of shoreline erosion, and acts as a buffer zone between the upland and the river. This riparian zone and adjacent forest land varies from approximately thirty feet to several thousands of feet in width. Although forested areas along the Green River and Barren River have undergone varying degrees of disturbance, few developments in the area have resulted in complete removal of riparian vegetation.

Prior to construction of the navigation lock and dam system, free-flowing conditions comprised of distinct habitat types probably existed in the Green River and Barren River. These habitats historically supported approximately 151 species of native fishes, making the fish faunas in these rivers among the most diverse in the United States. Free-flowing river reaches above Green River mile 199 presently contain diverse biotic communities and support populations of such species as smallmouth bass, darters, madtoms, sculpins, and other coolwater species. High quality riffle areas with sand and gravel substrate also contain a rich freshwater mussel fauna. Closure of the locks and dams altered riverine habitat by reducing flows, eliminating shoals and riffles, altering substrate composition from sand and gravel to finer sediments, and changing the rivers from free-flowing coolwater streams to slow-flowing warmwater streams. These changes in habitat type also resulted in species composition changes. Coolwater species were replaced by warmwater species such as largemouth bass, catfish, and bluegill. However, coolwater fisheries still exist in the river reaches above the impounded pools (i.e., above Green River Mile 199 and above Bowling Green). This shift in habitat conditions has also resulted in increasing population levels of "rough" species, predominantly carp, gar, and shad; and also of commercially important species such as buffalo, redhorse, and freshwater drum.

Important sportfish species which occur in the Green River and Barren River include largemouth, spotted, and smallmouth bass; bluegill; white and black crappie; channel catfish; longear, redear, and green sunfish; walleye; rock bass; sauger; white bass; and striped bass. There are also naturally-occurring populations of Ohio muskellunge in the Green River and in the lower Barren River and Nolin River. Habitat for the muskellunge is diminished in Kentucky due to development, impoundment, and pollution, but the Green River and Barren River still support good populations of this game species. Until recently, the tailwaters of the Green River and Barren River Reservoirs have been stocked with rainbow trout to provide additional sport fishing opportunities. Although this fishery likely no longer exists, rainbow trout have been observed in subterranean waters in the Mammoth Cave system. Commercial anglers also operate in the study area, with buffalo, suckers, and drum being important harvested species.

Construction of the navigation system on the Green River and Barren River has reduced the quantity and quality of freshwater mussel habitat. Many shoals with clean sand and gravel substrate have been replaced by slow-flowing, silt-bottomed pools. Currently, favorable habitat for remnant populations of the original mussel fauna generally only exists immediately below locks and dams and upstream from the river reach impounded by Lock and Dam 6. Historically, the Green River mussel fauna was comprised of more than 70 species, including at least six federally listed endangered species. A 1965 survey produced 46 species from the Green River; 39 species were reported from the free-flowing reaches above Mammoth Cave National Park; 34 species were collected from pools six, five, and the washed out pool four; and 29 species were found in the lower sections (i.e., pools one, two, and three). Recent surveys indicate that the Green River from Munfordville (GRM 225) to the upper reaches of pool six still supports the most diverse and abundant mussel community in the Green River basin; approximately 57 species are presently known to occur in this river section (Ronald Cicerello, Kentucky Nature Preserves Commission, personal communication). Surveys conducted in 1987 and 1988 yielded 40 species in the Green River from Lock and Dam 4 to Munfordville. Thirty species were collected in the lower Barren River, including two endangered species. Limited surveys above Barren River Lock and Dam 1 produced few live mussels, however, a survey conducted in 1990 revealed the presence of one endangered mussel species in the Barren River in the river reach between Bowling Green and Barren River Lake. Because intensive surveys have not been conducted, the mussel faunas of most of the Green River tributaries remain largely undescribed. However, mussels still persist in reduced numbers in the Pond, Mud, Rough, and Nolin Rivers. These populations have been and continue to be impacted by development and pollution. The ten most abundant mussel species that occur in the study area are the buckhorn (*Tritogonia verrucosa*), mapleleaf (*Quadrula quadrula*), deertoe (*Truncilla truncata*), three ridge (*Amblema plicata*), mucket (*Actinonaias carinata*), pink heelsplitter (*Proptera alata*), kidneyshell (*Ptychobranchus fasciolaris*), white heelsplitter (*Lasmigona complanata*), fluted shell (*Lasmigona costata*), and yellow sand shell (*Lampsilis teres*).

The rivers in the study area, their associated riparian habitats, and adjacent lands provide high quality habitat for a variety of wildlife species. These habitats support populations of well over 200 species of birds. Important game species include bobwhite quail, mourning dove, woodcock, and turkey. The area also provides winter habitat for important waterfowl species such as mallard, black duck, scaup, pintail, gadwall, and American goldeneye. In addition, wood ducks occur as residents during the summer and nest in the area. Common non-game species inhabiting the area include the eastern bluebird, red-tailed hawk, cardinal, blue jay, barred owl, downy woodpecker, and Carolina wren.

There is a diverse mammalian fauna in the study area. Eastern cottontail, gray and fox squirrels, white-tailed deer, raccoon, woodchuck, and opossum are common game species. Numerous karst features in the study area provide habitat for cave-dwelling species such as the big brown bat, little brown bat, eastern pipistrelle, and two endangered bat species; the gray bat and Indiana bat. Furbearers also occur in the area; important species include muskrat, mink, longtail weasel, striped and spotted skunk, beaver, raccoon, red fox, and gray fox.

Reptile and amphibian populations are prominent in the study area. Species composition is considered diverse due to the variety of habitat types that exist in the area. Common species include the hellbender, spotted salamander, green frog, snapping turtle, eastern box turtle, ringneck snake, eastern hognose snake, and northern water snake.

The Green River and Barren River drainages contain abundant cave and karst features. These subterranean habitats contain unique species including one species of cave crayfish which is endemic to the Mammoth Cave area. Three species of cave shrimp, including one endemic species, and three endemic cave beetle species also inhabit subterranean habitats in the study area.

Although portions of the study area provide high quality habitats and contain diverse and abundant populations of many fish and wildlife species, there are species that occur in the area that are rare; some are even threatened with extinction due to destruction or alteration of their habitats.

The Kentucky cave shrimp is endemic to the Mammoth Cave system. Populations of this rare species are thought to have been reduced by the impoundment of the Green River. Critical habitat has been designated for the species and includes the Roaring River passage of the Flint-Mammoth Cave system in the Edmonson County portion of Mammoth Cave National Park.

Caves in the study area also provide habitat for the endangered gray bat and Indiana bat. These caves are used primarily as hibernacula by these species, but there is one cave within the study area known to support a gray bat maternity colony. Future surveys in the study area may reveal the presence of other maternity colony caves. In addition, Indiana bat maternity colonies have been discovered in bottomland hardwood forests and other riparian areas in southern Illinois; mature, standing dead trees in riparian and upland forest habitats in western and northeastern Kentucky have also been found to be used by female Indiana bats as maternity sites. Therefore, it is possible that similar habitats in the study area may support maternity colonies of this species.

The study area is, or was historically, used by a number of federally listed species of birds. The rivers and reservoirs in the Green River basin provide suitable habitat for wintering populations of the threatened bald eagle and may also be used by nesting pairs. Nesting by bald eagles has been confirmed in areas to the west of the study area and may spread to the Green River and Barren River drainages as this species continues to expand its range. Although no recent nesting has been reported, the endangered American peregrine falcon occurs as a migrant or transient in the study area. Two extremely rare bird species may also utilize suitable habitats in the area; Bachman's warbler was historically reported to nest in Logan County in low, wet forested areas. There have been no recent confirmed sightings of this species in Kentucky, but a remnant population may still exist and nest in bottomland hardwood habitats in the study area. Kirtland's warbler is a transient in central Kentucky during its spring migration.

Reaches of the Green River that provide habitat for freshwater mussels contain populations of endangered species. The rough pigtoe (*Pleurobema plenum*), orange-footed pearly mussel (*Plethobasus cooperianus*), northern riffleshell (*Epioblasma torulosa rangiana*), and pink mucket

pearly mussel (*Lampsilis abrupta*) are known to occur in river sections below several of the Green River locks, and live and fresh-dead specimens of the fanshell (*Cyprogenia stegaria*) and rough pigtoe have been collected recently in the Barren River. Fresh-dead specimens of the ring pink (*Obovaria retusa*) and clubshell (*Pleurobema clava*) have been found recently, indicating that these species persist in the Green River. Other listed mussel species that may still occur in the study area are the fat pocketbook (*Potamilus capax*), tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa*), cracking pearly mussel (*Hemistena lata*), and purple catspaw pearly mussel (*Epioblasma sulcata sulcata*). The Green River may be the only river, or one of only a few rivers, in which the orange-footed pearly mussel, ring pink, and purple catspaw pearly mussel are still reproducing; therefore, habitat protection and restoration in the study area are extremely important to the continued existence of these listed mussel species.

Open woods and woodland edge habitats where limestone bluffs grade into river bottoms may support populations of Price's potato bean (*Apios priceana*), a federally threatened plant species. In addition, moderately disturbed woodland edges or periodically mowed fields may contain populations of the threatened Eggert's sunflower (*Helianthus eggertii*).

The Green River and Barren River study area also provides habitat for a number of rare species that are potential Federal candidates for listing. Terrestrial or aquatic habitats in the study area may support populations of the southeastern bat, Rafinesque's big-eared bat, small-footed bat, eastern small-footed bat, eastern woodrat, Bachman's sparrow, eastern sand darter, northern cave fish, southern cavefish, longhead darter, blue sucker, hellbender, Kirtland's water snake, copperbelly water snake, spectacle case pearly mussel, Kentucky creekshell (mussel), rabbits foot pearly mussel, purple lilliput pearly mussel, false foxglove, pale false foxglove, royal catchfly, and Gattinger's lobelia. None of these species are currently considered to be candidate species, however, they could be elevated to such status and listed in the future if their numbers decline and threats to their survival continue.

Fish and wildlife resources in the study area are expected to remain stable or exhibit slight declines as construction, development, and agricultural activities impact or alter terrestrial, subterranean, and aquatic habitats.

Project Alternatives and Potential Impacts

The proposed actions under study involve repair or removal of one or more of the navigation facilities on the Green River and Barren River above Lock and Dam 3. Repairs would involve those actions necessary to maintain safe conditions for visitors and recreationists. Since these facilities may qualify for registry as historic sites, interpretive displays may be constructed at one or more of the sites. Alternatives under consideration include:

No Action: Green River Locks and Dams 3, 4, 5, and 6; and Barren River Lock and Dam 1 would remain in place in their current conditions.

Repair facilities: Repairs needed to maintain safe conditions will be made where needed to appropriate facilities such as lock walls, approach walls, gates, etc.

Removal of facilities: Work under this alternative would involve complete removal of only the dams (the remaining portion of the dam would be removed at Lock and Dam 4). Lock walls, gates, and approach walls would remain. Lock chambers would either be filled with concrete or the gates would be welded shut. Other repairs would be made to the remaining facilities to maintain safe conditions. This alternative would be implemented on one or more of the above-listed facilities after coordination with and with support of the local governments and communities.

The "no action" alternative would likely result in short-term benefits to aquatic resources below the locks and dams. Although the dams pass high river flows, they likely retain sediment during low flow conditions. Consequently, the dams act as sediment traps and permit gradual flushing. However, since no maintenance has been done on these facilities for quite some time and no work would be done under this alternative, there is a possibility that the dams would eventually be breached as was Dam 4. Rapid drops in river level resulting from such breaches could cause significant sloughing of river banks and sediment deposition downriver. Also, at Lock and Dam 6, the river is cutting around the landward side of the lock. Emergency repairs were conducted by the Corps to alleviate this cutting. However, if the no action alternative is selected, this condition would likely continue. The uncontrolled release of impounded waters could result in significant bank erosion at and downriver from the lock.

Selection of the repair alternative would possibly result in the following work at each facility:

Green River

Lock and Dam 3 - Placement of large rock between the miter gates to an elevation equal to the dam to stabilize the gates and pool. Miter gates may be removed or cut off to a height equal to the dam if safety is a concern.

Lock and Dam 4 - Removal of miter gates if safety is a concern.

Lock and Dam 5 - Placement of large rock between the miter gates to an elevation equal to the height of the dam to stabilize the pool. Rock placed to fill in the land side valve pits and bulkhead

slots. Removal of walkway planks to eliminate access to sheet pile cells. Removal of miter gates or cutting the gates to the height of the dam if safety is a concern.

Lock and Dam 6 - Extension of the sheet pile cut off wall 15 feet farther into the riverbank to control seepage. Cutting of miter gates to a height equal to the concrete encasement if safety is a concern. Pushing the upper land side guide wall into the lock chamber. Placement of riprap against concrete steps on the outside of the monolith to stabilize the steps for use by anglers.

Barren River

Lock and Dam 1 - Placement of large rock between the miter gates to an elevation equal to the dam to stabilize the lock chamber. Removal of miter gates or cutting the gates to equal the height of the dam if safety is a concern. Placement of rock to fill bulkhead slots and valve pits to prevent falling hazard.

The purpose of this alternative would be to make the structures safe for future use by anglers and other recreationists. Since all work would be done on or inside the locks, no significant impacts to fish and wildlife resources would be anticipated. However, since no work would be done on the dams, there is a possibility that one or more might be breached in the future; impacts from that occurrence are discussed under the "no action" alternative. Long-term impacts would depend on commitments to perform future maintenance on these facilities.

Long-term impacts from removal of the navigation facilities on the Green River and Barren River would be beneficial to the native, pre-impoundment, fauna. Restoration of riverine conditions would allow for recolonization of previously impounded river reaches by fish species, such as darters and minnows, which inhabited those reaches prior to construction of the locks and dams. As they recolonize restored riverine habitats, those fish species that serve as hosts for glochidia of freshwater mussels would increase the potential for recolonization of restored riverine habitats by mussels. Removal of the dams would also likely lower the overall water level in the rivers and allow vegetation to become established on eroding riverbanks, thus reducing sedimentation of the rivers.

Removal of Green River Lock and Dam 6 would result in beneficial impacts to resources at Mammoth Cave National Park. The presence of this structure is the single greatest unresolved ecosystem management issue at Mammoth Cave National Park (Henry Holman, Mammoth Cave National Park, personal communication). Although quantitative data are not available, the presence of Lock and Dam 6 is believed to have resulted in significant sedimentation of the subterranean waters in the Park, the habitat of the Kentucky cave shrimp. Additionally, creation of the pool behind the dam has precluded access to previously accessible portions of the cave system (e.g., Echo River) and has caused sediment deposition in the river throughout the Park. During drought

conditions in 1988, the Green River in the Park exhibited nearly pre-impoundment conditions. Some degree of sediment flushing around islands in the river was observed by Park personnel (Henry Holman, personal communication). It is believed that if Lock and Dam 6 were removed, accumulated sediment around islands and in subterranean waters would eventually be flushed downriver, restoring habitat for freshwater mussels and cave-dwelling fauna. Tours to currently inaccessible portions of the cave could resume, and concessioners dealing in canoe and kayak rentals would be expected to experience significant increases in business. Ferries currently operating in the Park would be adversely affected by the lowering of water levels, however, with relatively minor extensions of the access roads, this would be a temporary impact (Henry Holman, personal communication).

Short-term adverse impacts to fish and wildlife resources could result from the removal of navigation facilities. Rapid removal of the dams could result in flushing of accumulated sediment in the pools behind the dams. If contaminants are present in accumulated sediments, resuspension and flushing of those sediments could degrade water quality downriver to an extent that the aquatic communities are adversely affected.

Conclusions and Recommendations

Although it has been heavily impacted by a variety of activities, the Green River still contains one of the most diverse aquatic faunas in the world. Impoundment of the Green River and Barren River for navigation, flood control, water supply, and recreation has significantly reduced native aquatic species for many miles and restricted extant populations to small reaches of the rivers where free-flowing conditions remain. Other activities in these drainages such as agriculture, urban development, timber harvest, coal mining, and oil and gas drilling have further impacted aquatic communities as a result of water quality degradation and sedimentation.

If the "no action" alternative is selected, impounded conditions in the Green River and Barren River, and associated adverse impacts to fish and wildlife resources, would remain. Without periodic maintenance, the structures would deteriorate and eventually fail, potentially resulting in more severe adverse impacts to downstream resources.

Removal of Lock and Dam 6 on the Green River would restore free-flowing conditions to 17 miles of the Green River through Mammoth Cave National Park, 7 miles of the Nolin River, and to subterranean waters in the park. Consequently, this river reach would be available for recolonization by riverine species of fish and freshwater mussels as accumulated sediment is flushed downriver and pre-impoundment habitat conditions (i.e., riffles and shoals with sand/gravel/cobble substrate) become reestablished.

If all four dams on the Green River (i.e., Dams 3, 4, 5, and 6) and Barren River Dam 1 were removed, approximately 94 miles of the Green River, 15 miles of the Barren River, and 7 miles of the Nolin River would be largely restored to their pre-navigation conditions. Such restoration, if conducted with protection of sensitive species in mind, should eventually result in recolonization by native aquatic species in surface and subterranean waters. Additionally, this alternative would contribute toward the recovery of 18 Federal and/or State-listed endangered, threatened, and rare species. Although fewer benefits to fish and wildlife resources would be gained if all the aforementioned dams are not removed, the removal of any of the identified structures would have significant benefits to native species.

Implementation of one of the actions under the removal alternative would result in long-term benefits to the native aquatic fauna. However, significant, but temporary, adverse impacts could result during removal of the dams. To minimize potential adverse impacts associated with the removal of any structure, the Service recommends that the Corps include the following measures in project plans:

1. Prior to beginning removal of a navigation facility, a thorough examination should be made of accumulated sediments behind the dam to determine the level of contaminants present, if any. If significant levels of contaminants are detected, the Corps should explore the possibility of manually removing as much of the contaminated sediment as possible and hauling the material to an approved upland disposal site.

2. Removal of an individual navigation dam should be accomplished gradually in stages to prevent downriver flushing of large amounts of sediment, and should be conducted only during a period of low-flow conditions.

3. As part of the plan development process, all potential impacts to fish and wildlife resources resulting from implemented of the selected alternative should be carefully documented. Impacts from sedimentation, reduced water levels in the pools, de-watering of aquatic habitats, and any other changes that may result from removal of existing facilities should be evaluated in detail. Measures should be developed and included in the final plans to avoid or minimize those impacts.

Upon selection of a preferred alternative for disposition of Corps of Engineers' navigation facilities on the Green River and Barren River, a biological assessment should be prepared and a determination should be made of whether or not the preferred alternative is likely to adversely affect federally listed species. If a "likely to adversely affect" finding is made, the Corps should initiate formal consultation with the Service.

Appendix H:
Public Involvement

Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1
Disposition Feasibility Study, Kentucky

Appendix H - Public Involvement

For the Green and Barren Rivers Navigation Disposition Study, coordination with federal, state, and local officials was accomplished early and often throughout the conduct of the study. Numerous meetings were held with officials as the study team gathered data and made analyses related to the study. Most often, this was done on an informal basis.

A public meeting was held in June 2001 at Butler County High School in Morgantown, Kentucky in conjunction with the release of the draft report. A public notice was mailed in advance of that meeting. A second public notice was mailed in March 2002, to announce that a recommendation contained in the draft report had changed.

In response to the public meeting, as well as the release of the 2010 draft report, the District received a considerable volume of feedback, much of it opposed to the Corps' recommendations. A representative sample of those letters is contained in this appendix. These letters were written by local officials as well as by private individuals. Most often, the concern expressed was related to the water supplies for local communities. Since there are no water intakes in the Green River Lock and Dam 6 pool, the only facility for which removal was recommended, these concerns are not relative. A considerable number of letters questioned the Corps' decision in 1965 not to repair Green River Lock and Dam 4 after it failed, putting an end to navigation from that point upstream. A number of other letters commented on the Corps' "lack of maintenance" for these facilities, claiming that the Corps should have continued upkeep on the facilities and maintenance dredging, even though the facilities were no longer in use.

A number of responses were received expressing support for the deauthorization of the projects and the removal of Green River Dam 6. These letters came from organizations such as The Nature Conservancy, Mammoth Cave National Park, Kentucky Waterways Alliance, and Trout Unlimited. These letters are included in this appendix as well.

In February 2014, the updated Green and Barren Rivers Navigation Disposition Study and the associated Environmental Assessment were released again for public comment and review. The 2014 disposition study essentially contained the same recommendation with the removal of Green River Dam 6 and minor safety modifications at the other Lock and Dam facilities. All letters and emails are contained in this appendix.

A major focus of the letters written by individual and local officials centered on the removal of Green River Dam 6. In contrast to the response to earlier iterations of the disposition study, the public comments on the 2014 disposition study were mixed. Letters and emails ranged from opposition for removal of Green River Dam 6 to fully supporting the removal of all dams in the Upper Green River System.

There are still concerns with the continued operation of the ferries in Mammoth Cave National Park and impacts to the Brownsville, Kentucky water intake associated with the removal of

Green River Dam 6. However, the study addresses the continued operation of the ferries and it is not anticipated that there will be any impact to the Edmonson County Water District water intake as a result of the removal of Green River Dam 6. Further, Green River Lock and Dam 6 has a serious seepage problem that is destabilizing the right abutment of the lock chamber. A sudden failure of this abutment would impact the Edmonson County water intake structure 1,500 feet downstream and render the two ferries upstream of the dam inoperable. Specifically, the impact from the sudden failure of the dam will result in severe erosion of the right descending bank and increased turbidity which will have a direct impact to the water intake structure. The controlled demolition of Green river Lock and Dam 6 will mitigate the risk to the water intake structure and ferry crossing associated with a sudden failure of the dam.

Additional comments from individuals expressed support for removal of Green River Dam 6 and encouraged the Corps to remove the remaining dams in the Upper Green River System. These lock and dam projects were authorized for navigation only and this study focuses on whether or not the projects should be deauthorized. It is acknowledged that the cleanest alternative from the point of view of disposal is to remove the dams. However, it would be problematic to remove all dams given multiple communities dependence upon the pools for water supply. The Corps does not have an authority to expend funds to study or modify water supply systems or assist other entities study or modify theirs. From a Corps perspective, water supply is considered to be a local responsibility. During the review period for the Corps' 2001 draft report, local water authorities expressed concern that if the dams were removed, the lower pool elevations would not reliably support their supply systems even if intakes were lowered and treatment facilities were enhanced. The Corps did not receive any comment to the contrary from these authorities on the 2014 draft report, and there is no local support for or interest in studying the potential for modified intake structures to accommodate lower pools. For these reasons, the Corps has been coordinating with local officials to assume ownership of the dams that provide water supply.

The study team also acknowledges that removal of the dams would be beneficial from an environmental standpoint. However, while the Corps has authority to plan, design, and build projects to benefit the environment, these projects require a local sponsor. Throughout the study process, the Corps was not able to identify a local or state agency willing to share in the costs of dam removal for environmental purposes. Therefore, we could not recommend the removal of the dams for environmental reasons. Further, the construction recommended at each site is directly related to the safe and orderly disposal of the facilities Sepcifically, the recommendation to remove Green River Dam 6 was primarily based on safety concerns associated with the impacts associated with a sudden failure of the structure and the volume of canoe and kayak traffic in this stretch of the Green River..

One public comment letter requested information regarding the impact that the disposition study would have on current Federal Energy Regulatory Commission (FERC) permits on the lock and dam projects in the study area. Coordination with FERC was outside the scope of this study. However, it should be noted that of all the lock and dam sites under study for disposition, only Green River Lock and Dam 5 currently has an active FERC Preliminary Permit (P-14270), issued March 19, 2012 for a period of three years to study the feasibility of hydropower development at this site. Active licenses or applications have no impact on the decision to deauthorize and dispose of these projects.

The Rochester Dam Regional Water Commission (RDRWC) submitted comments that reiterated their interest in leasing or acquiring property rights at Green River Lock and Dam 3 and encouraged the Corps to take action to quickly dispose of the facility and take steps needed to maintain the pool formed by Green River Lock and Dam 3. The main report reflects this desire in Section10.3 and Section 13 of the main report. This comment was further supported by the Butler County Water System.

The Nature Conservancy, Kentucky Waterways Alliance and American Rivers supported the removal of Green River Dam 6. In addition, they also encouraged the Corps to work with communities that utilize the pools formed by Green River Locks and Dams 3 and 5 to explore modifications to their water intake structures that would allow for the eventual removal of these structures.

Mammoth Cave National Park (MCNP) submitted comments supporting the removal of Green River Dam 6. The MCNP also encouraged the Corps to explore modifications to Green River Dam 5 with the Edmonson County Water District that would allow for an additional 24 miles of unobstructed river while maintaining the function of their water intake. As noted in the discussion above, water supply is not a Corps authority and exploring alternate water sources or modifications to existing intake structures is outside of the Corps purview.

Similar to other comment letters, MCNP requested that additional coordination take place with the Corps in order to maintain the operation of the two ferries that operate in the park while removing the recommendation to dredge at the Green River Ferry. As a result, the report was modified to remove the recommendation to dredge at the Green River Ferry and the need to coordinate with MCNP was underscored in Section 10.6. The MCNP also requested further investigation and consultation regarding the preparation of Biological Assessments for the Kentucky cave shrimp and potential impacts to threatened and endangered mussels; continued operation of the gaging station at Lock and Green River Dam 6; and development of a Memorandum of Agreement with the Kentucky State Historic Preservation Office (KYSHPO). The preparation of a BA is addressed in section 8.3 of the EA and Section 10 of the main report was revised to detail coordination with the KYSHPO. The continued operation of the gaging station will be further addressed during the Preconstruction Engineering and Design (PED) phase of this study.

Finally, MCNP also expressed interest in the potential transfer of property at Green River Lock and Dam 6 to the National Park Service. This interest in acquiring the property at Green River Lock and Dam 6 was added to Section 13 of the main report. The full comment letter is available in this appendix.

The USFWS provided an updated Fish and Wildlife Coordination Act (FWCA) Report (Appendix G) during the Public Comment review of the 2014 disposition study. The FWCA Report offered a current assessment of the proposed alternatives and recommendations related to the disposition of those facilities. Similar to MCNP, there was support for the removal of Green River Dam 6 and a recommendation to transfer the properties to a qualified conservation organization that would ensure public access (e.g. MCNP). Further, the USFWS recommended that the Corps consider utilizing Alternative 3 (removal of dam) for all of the assessed locks and dams, and that it evaluate the potential to implement other habitat protection and restoration options and/or projects in the study area.

The USFWS advocated for modification of Green River Lock and Dam 5 to ensure that backwater from the facility does not impact the subterranean habitat of the Kentucky cave shrimp or restored mussel habitat above Lock and Dam 6. Regarding the issues of water supply, the USFWS recommended that the Corps assist local communities and water authorities to develop alternatives that would make retention of the dams and associated impoundments unnecessary for municipal water supply.

The USFWS stated the implementation of the Corps' preferred alternatives at each of the facilities could have direct and/or indirect adverse effects on federally-listed species. These effects may be caused by the dewatering of habitat areas upstream of Green River Lock and Dam 6, release and movement of sediment both upstream and downstream of Green River Lock and Dam 6, releases of contaminated sediments (if present), and alterations of normal behavior patterns and fish host availability as areas above Green River Lock and Dam 6 transition from to a lotic (riverine) condition. Because of these potential effects, surveys for federally-listed species may need to be conducted, and a Biological Assessment (BA) may need to be prepared for any particular action that the Corps may implement during PED. Section 8.3 of the EA was revised to include the USFWS decision that a BA is not needed at this time. Information on the occurrences of federally listed species in the study area was also provided by the USFWS, and incorporated into Section 3.9.3 of the EA. As stated in Section 4.11.3 of the EA, The proposed method of dam removal would involve a gradual drawdown of the pool to reduce the potential for bank sloughing and erosion associated with rapid water level change. A gradual drawdown would also lessen impacts to the aquatic fauna above and below Green River Dam 6.

Additionally, the USFWS suggested the Corps complete an examination of accumulated sediments upstream of the dam and determine the appropriate method of dam removal to control the release of sediments downstream so that negative impacts to the aquatic fauna and downstream facilities and lands are avoided and/or minimized. Concerns of contaminated sediment are addressed in Section 4.7.3 of the EA. It is not anticipated that soils above Dam No. 6 would have contamination issues since the samples from further downstream at Lock and Dam no. 3 were not problematic. It is assumed that soils upstream of Lock and Dam No.3 would be less likely to accumulate harmful constituents due to the decreasing size and land use of the watershed. However, as stated in Section 8.1 of the EA, the Corps will be applying for a 401 Water Quality Certification during PED and before construction activities began. It is likely that this permit will require sediment sampling above Dam No. 6. In this case, the Corps will comply with all requirements of the permit.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) also submitted a letter indicating that the conclusions and recommendations outlined in the FWCA Report were acceptable. A separate comment letter from KDFWR was also submitted and echoed concerns similar to USFWS. Specifically, KDFWR voiced their support for the removal of Green River Dam 6 and encouraged the Corps to consider Alternative 3 for the remaining dams. KDFWR's support for the removal of dam 6 was qualified: it noted that additional information is needed in impacts to Asian carp movement, sediment upstream of the dam, sediment contamination studies, demolition methods, physical channel effects from the pool elevation changes, and construction season.

Section 4.11.3 of the EA states that the method of dam removal would involve a gradual drawdown of the pool to reduce issues associated with rapid water level changes. Any construction activities would occur during low water season. In regards to the concerns of increased Asian carp movement, Dam No. 6 currently does little to impede carp movement within the Green River. Asian carp are more likely to travel upstream during high water events, at which times Dam No. 6 can be completely inundated. The dam's inefficiency as a migration barrier is further evidenced by the fact that Asian carp have already been found upstream of Dam No. 6. It is the Corps' stance that restoring natural ecosystem processes through removal of Dam No .6 will lessen the effects of invasive species on the biological resources of the Green River.

Additionally, the KDFWR stated that the proposed alternative of fan fencing barricade installation and signage with presently unspecified parties to acquire property ownership and maintenance responsibility is not a viable alternative to the responsible disposition of these Federal properties. This alternative was chosen by the Corps because it was the least costly method to reasonably secure these facilities. Any additional investment for this purpose was considered excessive and outside the scope of this study.

Questions were also raised by KDFWR regarding the uncertainty of future ownership of the projects and how this may impact or benefit aquatic and recreation resources. In the absence of a definitive future owner of the projects and if Alternative 3 was found to be infeasible, KDFWR recommended that the Corps pursue the no action alternative at Green River Locks and Dams 3, 4, 5 and Barren River Lock and Dam 1. During the General Services Administration (GSA) disposal process, other federal agencies will have the first opportunity to assume control of these facilities, and consequently, have the ability to achieve any ecosystem restoration or other endeavors within their respective missions. Furthermore, it is outside the scope of this disposal study to identify specific entities to assume control of these facilities after deauthorization and disposal.

Additional comments were received from the Kentucky Division of Water, 401 Water Quality Certification Section. Comments discussed the method of removal for Green River Dam 6; analysis of sediments that may be behind the dam; and consideration to remove all dams. Similar to other agency comments, the uncertainty surrounding who may assume ownership of these properties following deauthorization is a concern for the Division of Water. Section 8.1 of the EA was revised to include the Division of Water's acknowledgment that the Corps will submit a § 401 Water Quality Certification application prior to beginning construction activities.

The KYSHPO submitted comments focusing on compliance with Section 106 of the National Historic Preservation Act (NHPA). The agency continues to concur with the National Register of Historic Places eligibility of the locks and dams and that transfer from federal ownership would result in an adverse effect to these historic properties. The agency also agreed that developing a Memorandum of Agreement (MOA) or a Programmatic Agreement was the appropriate course of action to resolve adverse effects and ensure compliance with the NHPA. The KYSHPO also recommended that, as Section 106 consultation moves forward, the Corps consider updated photographs of land-based structures at the facilities (KYSHPO is requiring current photographs but formal studies are not anticipated), ways to preserve the integrity of the facilities going forward and a plan to address the potential inadvertent exposure and discovery of cultural resources resulting from removal of Lock and Dam 6.. The agency also recommended

Dr. George Crothers, Director of the Office of State Archaeology, as a consulting party due to his specific expertise on the resources of the study area. Further the agency concurred with Section 106 consultation and execution of a MOA being completed during design work (PED) and prior to the commencement of any demolition/construction activities. Section 9.0 of the main report was updated to include acknowledgement of the ongoing coordination with the KY-SHPO, and Section 8.9 was added to address the NHPA.

At the time the 2014 Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study, Kentucky was originally made available for public review, the Corps recommended seeking Congressional deauthorization of the projects' purpose, modification of several of the facilities, and ultimately disposition of the facilities. The Study was subsequently changed to recommend only deauthorization, with minor modification of and, ultimately, disposal of the facilities to be undertaken outside the purview of the Study's recommendations.

The contents of this appendix:

1. Public Notices (June 2001 and March 2002)
2. Mailing List (2001 & 2002)
3. Letters from Agencies and Organizations (2001 -2002)
4. Letters and Emails From Individuals (2001-2002)
5. Public Notice (February 2014)
6. Mailing List (2014)
7. Letters From Agencies and Organizations (2014)
8. Letters and Emails from individuals (2014)

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
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P.O. BOX 59
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May 31, 2001

Planning Branch
Plan Formulation Section

PUBLIC NOTICE

Green and Barren Rivers, Kentucky
Navigation Disposition Study

TO WHOM IT MAY CONCERN:

Notice is given that the U.S. Army Engineer District, Louisville has prepared a report related to the disposal of formerly used navigation sites along the Green and Barren Rivers in Kentucky. This report was prepared under the authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-611). This is a general authority for the Secretary of The Army to review completed projects, when found advisable due to changed physical, economic, or environmental conditions.

The sites investigated in this study are:

- Green River Lock and Dam #3, located near Rochester, Kentucky
- Green River Lock and Dam #4, located at Woodbury, Kentucky
- Green River Lock and Dam #5, located near Glenmore, Kentucky
- Green River Lock and Dam #6, located near Brownsville, Kentucky
- Barren River Lock and Dam #1, located near Greencastle, Kentucky

These projects were built in the years between 1833 and 1934, and were used for commercial navigation until locking operations ceased in 1981 at Green River Lock #3. Since that time, the U.S. Army Corps of Engineers has been maintaining these facilities in a caretaker status. The Corps still has ownership of the properties and inspects the facilities periodically. A study was done in the early 1990's to determine if it would be feasible to restore navigation to the upper reaches of the Green River. That study found that there were insufficient benefits from commercial navigation operations to support restoration of navigation.

The purpose of this study was to prepare a report making recommendations regarding the possible deauthorization and disposal of the facilities. The major components of the disposition study are:

- An analysis of the condition and stability of the structures, including an analysis of the risk of failure of the structures in their current condition.
- Cost estimates of restoring structural integrity and improving the public safety of the sites.
- Cost estimates of demolition of the structures.
- An inventory of the non-navigation uses of the pools, such as boat ramps, water supply intakes, ferries, etc.
- A determination of the consequences of the loss of pool through failure or deliberate demolition to these facilities.
- A description of the fish and wildlife resources of the properties and the pools.
- A determination of the potential consequences, positive and negative, of the loss of pool to the fish and wildlife resources.
- A description of possible hazardous, toxic and radiologic waste on the properties.
- A description of cultural resources at the sites. A determination of the government's responsibility in relation to these resources.

This report will recommend that the projects be deauthorized and that the properties be disposed. The report will also recommend that certain construction be done prior to disposal of the properties in order to improve the public safety at the properties. This construction would consist of the following items at these sites:

- At Green River Lock and Dam #3, the lock chamber would be filled with rock. Additionally, rock would be placed around the outside of the lock chamber at a slope from the top of the lock wall to the river bottom, to eliminate the vertical face of the lock wall. Buildings at the site would be demolished.
- At Green River Lock and Dam #4, rock would be placed in and around the lock chamber as at Lock #3.
- At Green River Lock and Dam #5, the lock chamber would be filled with rock. Additionally, rock would be placed around the outside of the lock chamber at a slope from the top of the lock wall to the river bottom, to eliminate the vertical face of the lock wall. Buildings at the site would be demolished.
- At Green River Lock and Dam #6, the dam would be removed. This would be accomplished by constructing a platform out across the river on the upstream side of the dam from the lock side of the river. The dam would be breached slowly, and the material removed from the dam would be placed in the lock chamber. The construction platform would also be demolished as demolition of the dam proceeds toward the lock. Material used to construct the platform would also be placed in the lock chamber. Additional material would be placed around the lock chamber to eliminate the vertical face of the lock wall.
- At Barren River Lock and Dam #1, the dam would be breached. A section of the dam 135 feet long would be removed. This would be accomplished by building a platform across the lock chamber and across the downstream face of the dam to

the point where removal would begin. The material removed from the dam would be placed in the lock chamber. The construction platform would also be removed and placed in the lock chamber. Additional rock would be placed in the lock chamber and around it to eliminate any vertical faces that would pose a safety hazard. Buildings at the site would be demolished.

After the recommended construction is complete, ownership of the properties would be transferred. The disposal would follow a specific procedure. With the exception of the property at Green River Lock and Dam #6, the properties would be disposed in the following manner:

- The properties would first be offered to other Department of Defense agencies.
- If no Defense agency accepts the properties, then they would be offered to other Federal agencies.
- If no Federal agency accepts the properties, then they would be offered to state agencies.
- If no state agency desires the property, then it would be offered to local governments.
- If there were no transfer at this point, then the properties would be placed for sale on the open market.

In the case of Green River Lock and Dam #6, the report will recommend that ownership of the property on the right side of the river (the lock side) be conveyed directly to Edmonson County, which has expressed an interest in ownership.

After the projects are deauthorized, the Corps will no longer act as caretaker of these properties.

The Corps of Engineers will be holding a workshop to present the recommendations of this report to the public. This meeting will be held at Butler County High School in Morgantown, Kentucky at 7:00 pm on June 26, 2001. Anyone may attend this meeting.

A copy of the report will be available on the Louisville District Corps of Engineers website on June 5, 2001. The address of the Louisville District's home page is http://www.lrl.usace.army.mil/. From that page, you will find a link to the Green and Barren River Navigation Disposition Study. The report will also be available on a CD-ROM or in a hard copy. If you wish to receive a CD-ROM, please submit your request to Ms. Jane Ruhl, CELRL-PM-P, at the address given above, or e-mail jane.c.ruhl@lrl02.usace.army.mil, or telephone (502) 315-6862. CD-ROMs will be shipped at no cost. A shipping address must be included with the request.

Bound copies of the report will cost $25.00. If you wish to receive a bound copy of the report, please submit your request in writing to Ms. Jane Ruhl, CELRL-PM-P, at the address given above. Payment should be in the form of a check made out to "U.S. Army Corps of Engineers" and must accompany the request. A shipping address must be included with the request.

Copies of the report will also be available for your inspection at the following locations:

- Central City Public Library, 108 East Broad Street, Central City KY 42330
- Bowling Green Public Library, 1225 State Street, Bowling Green, KY 42101
- Muhlenburg County Public Library, 117 South Main Street, Greenville, KY 42345
- Ohio County Public Library, 413 Main Street, Hartford, KY 42347
- Butler County Library, 116 West Ohio Street, Morgantown, KY 42261
- Edmonson County Public Library, 503 Washington Street, Brownsville, KY 42210

Please address all comments or inquiries to the above address, ATTN: Ms. Jane C. Ruhl, CELRL-PM-P, or e-mail jane.c.ruhl@lrl02.usace.army.mil, or telephone (502) 315-6862.

Jane C. Ruhl

Jane C. Ruhl, P.E.
Project Manager
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DEPARTMENT OF THE ARMY
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CORPS OF ENGINEERS
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March 15, 2002

Planning Branch
Plan Formulation Section

PUBLIC NOTICE

Green and Barren Rivers, Kentucky
Navigation Disposition Study

TO WHOM IT MAY CONCERN:

The purpose of this public notice is to inform the public of a change in the recommendation for the Barren River Lock and Dam #1 in the Green and Barren Rivers Navigation Disposition Study.

Notice is given that the U.S. Army Engineer District, Louisville has prepared a draft report related to the disposal of formerly used navigation sites along the Green and Barren Rivers in Kentucky. This report was prepared under the authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-611). This is a general authority for the Secretary of The Army to review completed projects, when found advisable due to changed physical, economic, or environmental conditions.

The sites investigated in this study are:

- Green River Lock and Dam #3, located near Rochester, Kentucky
- Green River Lock and Dam #4, located at Woodbury, Kentucky
- Green River Lock and Dam #5, located near Glenmore, Kentucky
- Green River Lock and Dam #6, located near Brownsville, Kentucky
- Barren River Lock and Dam #1, located near Greencastle, Kentucky

This report was released for public review in June 2001. Since the time of the initial public release of that report and in response to public comment on that report, the Corps of Engineers has determined that the recommended plan for Barren River Lock and Dam #1 should be changed. This public notice deals with the changes in the recommended plan for Barren Lock and Dam #1. The recommendations for the other locks and dams remain unchanged.

This project was built in 1841 and was used for commercial navigation until 1965. The federal government acquired the facility in February 1886. A new lock was built in 1933-1934 at the same site, and was put into operation in September 1934. Since 1965, the U.S. Army Corps of Engineers has been maintaining this facility in a caretaker status. The Corps still has ownership of the property and inspects the facility periodically.

There are also a number of individuals who have intakes in the pool for private irrigation systems. The county also wants to keep these individuals' farming operations from being affected by any change in pool.

County officials are also concerned about the recreational use of the pool. Larger motorboats often use the pool. County officials fear that the loss of the pool would force the boaters to other areas. There are many opportunities for this type of water recreation in the area, with Barren River Lake and Nolin River Lake. Local officials fear that the local economy would suffer if boaters were forced to use different venues for their recreational boating. This concern also contributes to the county's desire to assume ownership of the lock and dam property.

Bowling Green Municipal Utilities fears that the loss of the pool would adversely affect the city's ability to meet pollution control requirements. While breaching the pool would improve the aeration of the pool and subsequently its BOD, local officials feel that the pool is necessary to meet standards for other pollutants. Again, local officials are willing for the county to assume ownership of the property in order to prevent loss of the pool.

Because of the willingness of Warren County to assume ownership of the property if the dam is not breached, the Corps has changed its recommendation to the following:

- The operations building would be demolished, and the debris placed in the lock chamber.
- Additional stone would be placed in the lock chamber to fill it. Stone would be placed on the outside of the lock chamber, sloping from the top of the lock walls to the river bottom.
- After this construction is complete, it is recommended that the property be directly conveyed to Warren County.

The public is invited to make comments on this change in recommendation at Barren River Lock and Dam #1. Comments or inquiries should be addressed to Ms. Jane C. Ruhl, CELRL-PM-P at the above address. Comments may also be made by e-mail to jane.c.ruhl@lrl02.usace.army.mil. A supplement to the draft report is available for review at www.lrl.usace.army.mil.

Jane C. Ruhl

Jane C. Ruhl, P.E.
Project Manager
Planning Branch

The purpose of this study was to prepare a report making recommendations regarding the possible deauthorization and disposal of the facility. The major components of the disposition study are:

- An analysis of the condition and stability of the structures, including an analysis of the risk of failure of the structures in their current condition.
- Cost estimates of restoring structural integrity and improving the public safety of the sites.
- Cost estimates of demolition of the structures.
- An inventory of the non-navigation uses of the pools, such as boat ramps, water supply intakes, ferries, etc.
- A determination of the consequences of the loss of pool through failure or deliberate demolition to these facilities.
- A description of the fish and wildlife resources of the properties and the pools.
- A determination of the potential consequences, positive and negative, of the loss of pool to the fish and wildlife resources.
- A description of possible hazardous, toxic and radiologic waste on the properties.
- A description of cultural resources at the sites. A determination of the government's responsibility in relation to these resources.

Previous Recommendation: The draft report released in June 2001 recommended that the project be deauthorized and that the Government dispose of the property. The report also recommended that the dam at Barren River Lock and Dam #1 be breached. The report recommended that a section of the dam 135 feet long be removed. The material removed from the dam would have been placed in the lock chamber. Additional rock would have been placed in the lock chamber and around it to eliminate any vertical faces that would pose a safety hazard. Buildings at the site would have been demolished.

Upon completion of the recommended construction, ownership of the property would have been transferred. The disposal would have followed a specific procedure. The original recommendation was to dispose of the property in the following manner:

- The property would first be offered to other Department of Defense agencies.
- If no Defense agency accepts the property, then they would be offered to other Federal agencies.
- If no Federal agency accepts the property, then they would be offered to state agencies.
- If no state agency desires the property, then it would be offered to local governments.
- If there were no transfer at this point, then the property would be placed for sale on the open market.

New Recommendation: Feedback from local public officials in Warren County and Bowling Green, Kentucky led to a reexamination of the plan formulation for the disposition of Barren River Lock and Dam No. 1. Several local officials and agencies contacted the Corps about the possibility of removing or breaching the dam. All of the officials were opposed to the alternative for various reasons. While the City of Bowling Green does not have a water intake in the pool formed by the dam at Barren River Lock & Dam #1, Bowling Green and Warren County officials regard the pool as a potential source of water. They believe that future growth and development of the city and county will require that additional sources of water be found. Warren County is interested in assuming ownership of the property upon a disposal action by the Corps as long as the dam is not removed or breached.

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Regional Director
Department of Health and Human Services
101 Marietta Tower
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State Highway Engineer
Department of Highway
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PO Box 10180
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Honorable David Martin
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PO Box 626
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American Rivers
Southeast Office
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Chattanooga ,TN 37403

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Washington,DC 20005

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Mr. Robert D. Bush
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Hartford ,KY 42347

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Bowling Green ,KY 42010-4939

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Professional Paddlesports Association
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Butler ,KY 41006-0248

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Red River Outdoors
415 Natural Bridge Rd
Slade ,KY 40376

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Box 662
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Whitley City ,KY 42653

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State University of New York
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Lexington ,KY 40507

The Gleaner
PO Box 4
Henderson ,KY 42419

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Kentucky Chapter
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Mr. Richard K. Kessler, Phd.
Green River Bioreserve Director
The Nature Conservancy
Kentucky Chapter
306 Meadow Ridge Drive
Campbellsville,KY 42718

TN Scenic Rivers Association
PO Box 159041
Nashville ,TN 37215-9041

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128 Hosick Ave.
Dawson Springs ,KY 42408

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Mr. Barry Morris
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Brownsville ,KY 42210

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695 Popular Spring Rd
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Ms. Peggy Meredith
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Mr. Gene Dillingham
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Mr. Michael B. Vincent
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Ms. Sherry Morgan
577 Allen Road
Drakesboro,KY 42337

Mr. Ray Buchanan
132 Allen Road
Drakesboro,KY 42337

Mr. Thomas L. Young
537 Nutwood Avenue
Bowling Green,KY 42103

Mr. David C. Spence
2188 Threlkel Ferry Road
Bowling Green,KY 42101

Mr. Robert Johnson
77 Water Street
Cromwell,KY 42333

Mr. Steve Bridges
112 North Church Street
Woodbury,KY 42288

FEDERAL EMERGENCY MANAGEMENT AGENCY
Region IV
3003 Chamblee Tucker Road
Atlanta, Georgia 30341-4130

July 5, 2001

Ms. Jane Ruhl
ATTN: CELRL-PM-PF
U.S. Army Engineer District, Louisville
Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Re: Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 Disposition Study

Dear Ms. Ruhl:

Thank you for your notice and request for comment on the above proposed project, and for your excellent presentation. Please address future correspondence of this nature to William Straw, Regional Environmental Officer at the letterhead address.

The Federal Emergency Management Agency (FEMA) has limited jurisdiction under Presidential Executive Order (EO) 11988 (Floodplain Management) and the National Flood Insurance Program (NFIP), with its Community Rating System (CRS) for flood insurance rates. FEMA provides relevant guidance, evaluations, findings, advisement/recommendations, and many other relevant services.

We have reviewed the Disposition Study and at this time we have no site-specific comments. However, the proposed project requires consultation with Floodplain Management Administrators (or other, similar titles) in each applicable NFIP-participating community and county, and in some cases, from the State Floodplain Management Coordinator. Your consultation with the local governments about their pertinent floodplain management concerns and ordinances may have already met this requirement.

The Study's several generally reassuring statements as to the proposed project's minimal flooding effects include, "The Green River or the Barren River lock and dam structures have little or no effect on larger flood water surface profiles" (Appendix B, page 17). We request that we be informed as to what general steps were taken to include consideration of the potential flooding effects and their possible cooperative remediation. In that regard we are requesting that we be granted an additional 30 days to respond based on that

added information. It appears that such an extension would not be detrimental to the indicated project schedule.

Thank you again for your excellent work, for the opportunity to review and comment on this proposed project, and in advance, for your response to our concerns. Please feel free to call me at 770.220.5432 with any questions on these and related matters.

Sincerely,

William R. Straw
Regional Environmental Officer

PM-P
Jane Rudd

United States Department of the Interior
NATIONAL PARK SERVICE
Mammoth Cave National Park
P.O. Box 7
Mammoth Cave, Kentucky 42259-0007

IN REPLY REFER TO:

L7621

July 20, 2001

Colonel Robert E. Slockbower
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Colonel Slockbower:

We have reviewed the "Disposition Study: Green River Lock and Dam Nos. 3-6 and Barren River Lock and Dam No. 1" and the appended Environmental Assessment. We appreciate all the effort and hard work that was required to produce the report. Our comments are limited to Lock and Dam No. 6 (LD6) because it directly affects Mammoth Cave National Park whereas the other facilities involved in the study do not.

Mammoth Cave National Park is a unique area. On October 27, 1981, Mammoth Cave National Park was listed by the United Nations Educational Scientific and Cultural Organization (UNESCO) as a World Heritage Site and on March 27, 1990, as an International Biosphere Reserve. In April 1996, the Mammoth Cave Area Biosphere Reserve was officially extended and now includes lands within Barren, Butler, Edmonson, Hart, Metcalfe, and Warren counties in Kentucky. As the primary land manager affected by decisions related to LD6 (over 90% of the LD6 pool is within Mammoth Cave National Park), we hope our comments will be useful to you in finalizing your report and environmental assessment.

The position of the National Park Service since 1951 has been and continues to be that the LD6 pool should be eliminated. The continued presence of this structure is the single greatest unresolved ecosystem management issue at Mammoth Cave National Park. The current situation has tremendous direct adverse effects on resources and resource values within Mammoth Cave

National Park as defined in the National Park Service (NPS) Organic Act of 1916 (16 USC 1); the NPS General Authorities Act of 1970, including amendments in 1978 (16 USC 1a-1); and the NPS Management Policies 2001 (Section 1.4).

Elimination of the LD6 pool would provide a number of benefits. The suitable habitat for a number of Federal threatened and endangered species and a large number of state list species would be increased. Mammoth Cave contains an internationally important, if not unique, ecosystem that is impaired by the LD6 pool which extends into Mammoth Cave itself, altering habitat, producing sedimentation, and impairing geological processes. Elimination of the pool would provide for restoration of the ecosystem and improve its long-term sustainability. Removal of the pool would also result in benefits for research and understanding of the longest and most renowned cave system in the world.

There would be benefits for recreational use of the river within the park by paddlers using canoes and kayaks. The river will remain accessible to small motorboats. We continue to operate park motorboats in the unimpounded reaches of the Green River above the LD6 pool during even the driest weather. Likewise, we do not believe there will be any adverse consequences related to fishing.

Any negative environmental effects related to removal of LD6 and modification of the ferries within the park appear to be only the minor and short-lived impacts related to construction activities. Conversely, the benefits are expected to be vast and long lasting. Therefore, we concur with the recommendation to remove LD6 and modify the ferry landings within the park and with the proposed Finding of No Significant Impact (FONSI).

Sincerely,

Ronald R. Switzer
Superintendent

cc:
Ms. Jane Ruhl, P.E., Project Manager

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

August 30, 2001

Jane Ruhl
ATTN: CERL-PM-PF
Department of the Army
U S Army Engineer District
Corps of Engineers
P O Box 59
Louisville KY 40201-0059.

Re: Disposal of formerly used navigation sites along the Green and Barren Rivers in Kentucky: Green River Lock and Dams #3 near Rochester, KY, #4 at Woodbury, KY, #5 near Glenmore, KY, # 6 near Brownsville, KY, and Barren River Lock and Dam #1 near Greencastle, KY. (SERO 2001-51)

Dear Ms. Ruhl:

The Natural Resources and Environmental Protection Cabinet (NREPC) serves as the state clearinghouse for review of environmental documents generated pursuant to the National Environmental Policy Act (NEPA). Within the Cabinet, the Commissioner's Office in the Department for Environmental Protection **coordinates** the review for Kentucky State Agencies.

The Kentucky agencies listed on the attached sheet have been provided an opportunity to review the above referenced report. Responses were received from nine (also marked on enclosed sheet) of the agencies that were forwarded a copy of the document. Attached are comments from the Kentucky Divisions of Water, Waste Management, and Air Quality, and The Kentucky State Nature Preserves Commission.

The Kentucky Heritage Council has requested a copy of the referenced report relating to the disposal of the navigation sites along the Green and Barren Rivers. Comments will be provided to the Louisville District of the Corps of Engineers after reviewing this report.

If you should have any questions, please contact me at (502) 564-2150, ext. 112.

Sincerely,

Alex Barber
State Environmental Review officer

Enclosure

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NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
ENVIRONMENTAL REVIEW

Disposal of formerly used navigation sites along the Green and Barren Rivers in Kentucky: Green River Lock and Dams #3 near Rochester, KY, #4 at Woodbury, KY, #5 near Glenmore, KY, # 6 near Brownsville, KY, and Barren River Lock and Dam #1 near Greencastle, KY.

The following agencies were asked to review the above referenced project. Each agency that returned a response will appear below with their comments and the date the project response was returned.

C denotes Comments
NC denotes No Comment
IR denotes Information Request
NR denotes No Response

REVIEWING AGENCIES:

Division of Water	comments
Division of Waste Management	comments
Division for Air Quality	comments
Department of Health Services	
Economic Development Cabinet	
Division of Forestry	
Department of Surface Mining Reclamation & Enforcement	nc
Department of Parks	nc
Department of Agriculture	
Nature Preserves Commission	comments
Kentucky Heritage Council	comments
Division of Conservation	nc
Department for Natural Resources	ns
Department of Fish & Wildlife Resources	
Transportation Cabinet	
Department for Military Affairs	nc

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

MEMORANDUM

TO: Alex Barber
State Environmental Review Officer
Department for Environmental Protection

FROM: Timothy Kuryla TK
EIS Coordinator
Division of Water

DATE: August 23, 2001

SUBJECT: SN, Filling of Locks along Green & Barren Rivers, (Edmonson, Muhlenberg, Ohio, & Warren Counties), SERO 010619-51

The Division of Water has reviewed the Scoping Notice for an Environmental Assessment to be prepared by U.S. Army Corps of Engineers (COE), Louisville District Office, regarding the filling of the locks along the Green and Barren Rivers:

River	Lock & Dam Number	River Mile (RM)	County
Green	4	149.1	Muhlenberg, Ohio
	5	168.2	Warren
	6	181.7	Edmonson
Barren	1	15.0	Warren

The Division of Water comments discuss matters the Division desires addressed in the EA.

WATER QUALITY
Wetlands

If the project can result in a discharge of dredge or fill material into:

- 200 linear feet of any "blue line" stream (as shown on the U.S. Geological Survey 7.5 minute topographical map for the project area), or
- One acre or more of any wetland,

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then a 33 USC § 1341 ("401") water quality certification by the Division of Water for the U.S. Army Corps of Engineers and a 33 USC § 1344 ("404") dredge or fill permit must be obtained. The EA must address the existence of wetlands (and wetland mitigation or replacement).

Construction Practices

In project construction, Best Management Practices (BMPs) must be utilized to prevent nonpoint source pollution and, thereby, control stormwater runoff and sediment damage to water quality and aquatic habitat. The EA must outline the BMPs proposed to be used. For technical assistance on the kinds of BMPs most appropriate for construction, please contact the Edmonson, Muhlenberg, Ohio, or Warren County Soil and Water Conservation District or the Division of Conservation of the Natural Resources and Environmental Protection Cabinet. The Division of Water, also, has available BMP construction manuals.

Barber, Alex (NREPC, DEP)

From: Palmer-Ball, Brainard (NREPC, KSNPC)
Sent: Thursday, July 26, 2001 12:23 PM
To: Barber, Alex (NREPC, DEP)
Subject: FW: KSNPC responses to KIRPs

From: Palmer-Ball, Brainard (NREPC, KSNPC)
Sent: Thursday, July 26, 2001 11:34 AM
To: Barber, Alex (NREPC, DEP)
Subject: KSNPC responses to KIRPs

TO: Alex Barber, NREPC-DEP, Intergovernmental Review Coordinator

FROM: Brainard Palmer-Ball, Jr., Ky State Nature Preserves Commission

RE: KSNPC responses to KIRPs

DATE: July 26, 2001

RE: Project No. SERO2001-51 (Green and Barren rivers Locks and Dams disposal)

KSNPC has reviewed this document and support the conclusions, especially removal or breaching of Green River Lock and Dam 6 and Barren River Lock and Dam 1. These actions would: (1) restore free-flowing riverine habitat to segments of the Green and Barren rivers currently impounded behind the dams; (2) allow stream communities, including freshwater mussels and fishes, the two most imperiled groups of organisms in the US, to recolonize these restored areas; and (3) restore natural hydrologic conditions to the unique Mammoth cave system . The free-flowing rivers of the US and Kentucky have been greatly degraded or destroyed by impoundment, channelization, and pollution. Elsewhere in the US, rivers and their aquatic communties have been restored by removing dams. The proposed actions are important first steps in the restoration of segments of the Barren and Green rivers.

We recognize that the proposed actions may adversely affect water supplies, ferries, and some commercial activities. However, we believe these affects can be resolved through planning and support from the Corps.

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

July 10, 2001

Division of Waste Management

Comments for Project #SER02001-51

All solid waste generated by this project must be disposed at a permitted facility.

During projects such as this soil contamination may be encountered. If this occurs, whatever is encountered must be properly addressed.

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JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION FOR AIR QUALITY
803 SCHENKEL LN
FRANKFORT KY 40601-1403

rev.2/99

RENOVATION/DEMOLITION NOTIFICATION REQUIREMENTS*

Under 401 KAR 58:025, all facility demolitions and those planned facility renovations involving removal of at least 160 square, 260 linear, or 35 cubic feet of friable asbestos over a year's time require notification to the Division for Air Quality at least ten weekdays before starting the job. Exceptions are emergency renovations (i.e., removals necessitated by a sudden, unexpected event) and ordered demolitions of structurally unsound buildings that are in imminent danger of collapse, in which cases the notification must be submitted no later than the next weekday after work starts. To notify, use either DEP Form 7036 or the form shown in Figure 3 of 40 CFR 763, Subpart M.

Annual or blanket notifications are required for facilities with many small removals, each of which is below the threshold amounts given above, but added together, they exceed those amounts over a calendar year. These are removals that are necessitated by routine failures of equipment and can be expected to occur over the upcoming calendar year based on past operating experience but for which an exact schedule cannot be predicted. Submit this notification at least ten weekdays before January 1, and include an estimate of the collective amount of these sub-threshold removals. To receive documentation that these removal projects are in compliance, you should phone our inspector in your region at least one day before doing each removal so that an inspection can be arranged.

Notification is recommended but not required for renovations involving nonfriable removals. However, if the nonfriable materials will be crumbled, abraded, ground, sawed, etc., such that they will become friable, then the ten-day prior written notification is required.

Update the notification as necessary when changes occur that invalidate information provided on an earlier notification. Updates are required when the amount of asbestos changes by at least 20%. If the removal's start date is delayed, alert our inspector in your region immediately by phone, and submit an updated notification no later than the original start date. If the new start date is earlier than the original start date, update the notification at least ten weekdays before the new start date.

Detailed instructions for completing notifications are given on the back of DEP Form 7036. Additionally, any questions on notifications or other asbestos requirements may be directed to any Division for Air Quality Regional Office (offices are located in Ashland, Bowling Green, Hazard, Florence, Frankfort, London, Owensboro, and Paducah).

***For informational purposes only.** Relying on this notice alone shall not guarantee full compliance with all legal requirements. This notice simply clarifies the notification provisions of 401 KAR 58:025.*

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Kentucky Intergovernmental Review Process
Division for Air Quality – Asbestos Comments

The project to which this comment is attached involves construction, renovation, demolition, or some other activity, which might result in the discovery of asbestos-containing materials. The Kentucky Division for Air Quality conditionally approves the proposed project, contingent upon conformance with regulatory requirements for asbestos. The information listed below provides guidelines on Kentucky's asbestos regulations:

Asbestos includes the asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actionolite-tremolite.

Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations.

Renovation means altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or taken out are excluded.

The coordinators of this project should be aware of the following facts and requirements:

- Breathing asbestos fibers can cause lung cancer and other respiratory diseases.
- Without proper precautions, renovations, demolitions, and even routine maintenance can release microscopic asbestos fibers into the air. Undisturbed asbestos materials, on the other hand, can be safely maintained if they are kept in good condition.
- Asbestos may be found in pipe and boiler insulation, flooring, roofing, wall and ceiling surfacing, ceiling tiles, exterior siding shingles, and even duct tape. More than 3,000 different products containing asbestos were used and are present in an estimated 733,000 public and commercial buildings and older residences nationwide.
- Before renovating or demolishing a structure, have it checked for asbestos by a qualified professional. Any asbestos that will be affected by the activity must be removed by a certified contractor before renovation or demolition begins.
- Written notification to the Division for Air Quality must precede asbestos removal and demolition of a structure in most cases. The purpose of these notifications is to allow Division inspectors an opportunity to check the site and assess the presence of asbestos.
- Removed asbestos wastes must be properly packaged, labeled and disposed at an approved landfill.
- The Division of Occupational Safety and Health Compliance, the Division of Waste Management, and the Transportation Cabinet also regulate handling, transportation, and disposal of asbestos. If a structure is owned by a federal or local agency, there may be additional procedural requirements for handling asbestos.
- The only outright exemptions from the Division's asbestos regulations are for homeowners who renovate or demolish their homes for residential purposes.

The requirements for asbestos may found in the following regulations:

401 KAR 57:011 Emission standards for asbestos
401 KAR 58:005 Accreditation of persons conducting asbestos work at schools
401 KAR 58:010 School management plan requirements; and
401 KAR 63:042 Requirements for asbestos abatement entities.

Questions may be directed to the Division for Air Quality, Special Programs Branch, at 502-573-3382.

Ruhl, Jane C LRL02

From: Richard Kessler [rkessler@tnc.org]
Sent: Tuesday, August 07, 2001 3:27
To: Ruhl, Jane C
Subject: L&D 6

Dear Jane,

On behalf of The Nature Conservancy, I would like to take this opportunity to speak in favor of the removal of Lock and Dam 6 on Green River. After much review and consultation with Corps staff, hydrologists, ecologists, park service staff and others, it is apparent that the potential positive impact on ecosystem health and ecological integrity resulting from the removal now far outweighs any potential positive economic impact of leaving the dam in place. We understand that this has been a divisive issue locally and that there has been some outspoken opposition. We also feel that there is a great deal of support from the conservation community, both organizations and individuals, that have not been voiced. The Nature Conservancy has always been interested in seeking common sense solutions to conservation challenges, and in this case the removal of L&D 6 makes the most sense in light of my earlier statements. It is our hope that the removal will be conducted in an environmentally sensitive manner and that we can all continue to seek ways to positively work together to enhance the ecology of the Green River and the communities that exist along its shores.

Sincerely,

Richie Kessler, PhD
Director
Green River Bioreserve
The Nature Conservancy
Kentucky Chapter

Kentucky Waterways Alliance
854 Horton Lane, Munfordville, KY 42765-8135
270-524-1774 Director@KWAlliance.org

August 6, 2001

U.S. Army Corps of Engineers, Louisville District
Attention: CELRL-OP-F
Ms. Jane Ruhl
P.O. Box 59
Louisville, KY 40401-0059

RE: Comments on June 2001, Green River Locks and Dams 3, 4, 5, and 6 & Barren River Lock and Dam 1, Disposition Study by the US Army Corps of Engineers

Dear Ms. Ruhl,

The Kentucky Waterways Alliance Inc. (KWA) is a statewide non-profit membership organization whose mission is to protect and restore Kentucky's waterways and their watersheds by building effective alliances for their stewardship. I submit these comments on behalf of KWA in response to the above referenced Disposition Study.

- We support improving public safety at each of the sites by filling in each of the lock chambers.

- We support the federal disposition of the sites and the plan to do so. KWA strongly encourages the Corps to continue to work with the affected local communities to present a clear and compelling case that it would be in their best interest to either move the existing water intakes out of the pools and allow the Corps to remove the dams or take ownership and responsibility for the land and the dam sites.

  Does the Corp have the data to support these public and private entities moving their water intakes to the natural river channel so that the Green River dams #3 and #5 could be removed? KWA can certainly understand the reluctance by local officials to assume the responsibility for these dams and it would appear that the pool created by the dams provide only some measure of short-term water supply drought "insurance" for these systems. If this is not an option, then we encourage the Corp to continue to provide community leadership and explore some joint public ownership for Lock & Dam #3 on the Green River since a number of water intakes are currently located in the pool from this dam. We also encourage the Corp to continue to work with Edmonson County for the public ownership of #5. Ultimately however, each water supplier is responsible for the water supply infrastructure including any dams used for their system.

- We would prefer the removal or #3 and #5 on the Green, but could support leaving them intact if the water supply intakes cannot or will not be moved or lowered from the pools associated with these Dams.

- We fully support the plan to remove Dam #6 on the Green River. The unsafe condition of this structure warrants its removal. The continued impacts on threatened and endangered species in Mammoth Cave National Park warrant its removal. The ongoing threat to recreational canoeists and small boaters on the river warrant its removal. The removal must however, be slowly and carefully carried out so as not to adversely impact Edmonson County Water intake 1500 feet downstream and to minimize the impacts of lowering the water levels in both the river and in the connected flooded cave passages. We hope this removal action can begin as quickly as possible for the reasons outlined above.

- We would prefer the removal of #1 on the Barren River given the increased margin of safety for recreational use on the river. If removal is not an option, we could support the notching of the 135-foot section of the dam as outlined in the study.

Thank you for the opportunity to comment, any questions or concerns should be addressed to our office.

Sincerely,

Judith D. Petersen

Judith D. Petersen
Executive Director

Ruhl, Jane C LRL02

From: Ruhl, Jane C LRL02
Sent: Monday, June 18, 2001 8:14
'Steve Woodring'
Subject: RE: Green River dams

Dear Mr. Woodring,

The decision to leave Dams 3 and 5 in place was based on the fact that the pools formed by these dams are being used for municipal water supply. While these projects were not constructed for water supply, the pools formed by the L&D 3 and 5 projects have become a vital public resource. Our recommendation to leave the dams in at these two sites recognizes that the water supply issues of removing the dams at these two sites outweigh the public safety issues associated with leaving the dams in at these two sites. The water supplies provided by these two pools are vital, and there are few, if any, viable alternatives for water supply. However, the recreational use of these pools is much less than the existing use of the Green L&D 6 pool and the projected use Barren L&D 1. Additionally, the recreational use of the L&D 3 and L&D 5 pools consists of local residents who are acquainted with the existence of the dam.

I hope this answers your question. Please let me know if you have any other comments or concerns. Thanks so much for commenting.

Jane Ruhl

-----Original Message-----
From: Steve Woodring [mailto:swoodring@kca.org]
Sent: Friday, June 15, 2001 2:43 PM
To: 'jane.c.ruhl@lrl02.usace.army.mil'
Subject: Green River dams

Dear Ms. Ruhl,

Thank you for the information concerning the decommissioning and disposition of the Green River Lock and Dam system. Trout Unlimited has long advocated the removal of dams on Green River which no longer serve their original intended function. We fully support the removal of Lock and Dam 6 on Green River, and the breaching of Dam 1 on Barren River.

After reading the materials on your web site, I am still unclear as to why the Corps chooses to leave Dam 5 in place, since Dam 4 has been breached by nature, thereby rendering Dam 5 useless. Particularly since its locks will be filled. Wouldn't removal eliminate a safety hazard and restore the natural biological processes in that reach of river? There would also seem to be little purpose to leaving Dam 3 in place, since its locks will also be filled. Why leave an unnecessary safety hazard and biological liability?

Trout Unlimited fully recognizes and supports the Louisville District Corps' decision to begin restoring Green River through dam removals. Additionally, we encourage you to take the extra step to fully restore all of the river no longer needed for commercial navigation, by removing Dams 3, 4, and 5.

Thank you for the opportunity to comment on this proposed action, and I look forward to your response.

Yours truly,
Steve Woodring
Kentucky Council Trout Unlimited
swoodring@kca.org

Patrick L. Curran
Attorney at Law
9202 Bermuda Court
Crestwood, KY 40014
502-241-1878

August 10, 2001

Jane Ruhl
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, KY 40201

Re: Removal of dams on Green and Barren Rivers

Dear Ms. Ruhl,

Rarely do I agree with Corps proposals. However, I wholeheartedly endorse the current proposal to remove the Brownsville dam on the Green River and the Greencastle dam on the Barren River.

These dams have outlived their usefulness and serve no useful purpose whatsoever. They have not carried navigation for 20 years. The only reason for their existence was commercial navigation. Lack of commercial traffic is reason enough to remove these antiquated obstructions. As it stands now, the Corps is saddled with maintaining the dams at taxpayer expense for no worthwhile purpose. From a cost-benefit perspective alone, they should be removed.

The pools created by these dams are not used to provide any water supplies of area communities, so their removal would not impact water supplies in the area. The dams were not built for flood control, and their removal would not increase the threat of flooding to the communities downstream. The large dams at Nolin Lake and Green River Lake can handle the flood control needs of these residents.

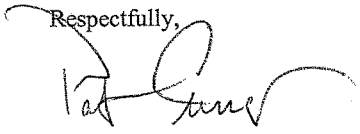
Apart from the obsolescence of these dams, there are beneficial reasons to remove these impoundments. The area in question is home to Mammoth Cave National Park. The existence of these dams has created an artificially high water level inside the Park's caverns and has halted the natural creation of caverns and formations at Mammoth Cave as well as in other area caverns. This area is a recreational mecca for tourists from around the world. Most come for the cave tours, but there is much to do on the surface as well. Increasing numbers of people enjoy canoeing, kayaking and fishing the Green and Nolin Rivers. The dam at Brownsville makes for poor canoeing conditions and actually makes it more dangerous. Years ago, my wife and I were canoe-camping on the Nolin

between the Nolin Lake dam and the confluence of the Green River. Our take-out point was at Houchins Ferry, about 2 miles upstream on the Green River. The Green River was raging that day, and we needed to paddle upstream in turbulent muddy water. Less experienced paddlers could easily have been swept downstream and over the hazardous Brownsville dam and could have drowned. It truly is dangerous.

Changing the river back to its natural river habitat would benefit local businesses that depend on tourism. More people would come to canoe these beautiful rivers. Removing the dams would improve conditions inside Mammoth Cave National Park. Removing the dam creates no shortage of water for drinking or other use to area residents. No commercial traffic is affected by removal of the dam. And then there are the benefits for those who love to fish. Bonny Laflin, a biologist for the Kentucky Department of Fish and Wildlife was quoted in the Louisville Courier Journal that flowing water is more productive than stagnant pools for fishing purposes. She went on to say that "It's always better to have an open stream than a pooled stream."

To recap, removing the dams benefits tourism business, benefits conditions inside Mammoth Cave, benefits canoeists, benefits fishermen, and harms no one. So, let's do the logical thing for a change. Remove these dams. And when these are gone, let's look for others that may have outlived their usefulness as well. Go Corps!

Respectfully,



Patrick Curran

MILLIKEN LAW FIRM
410 EAST TENTH AVENUE
P.O. BOX 1640
BOWLING GREEN, KY 42102-1640

W. CURRIE MILLIKEN
WESLEY V. MILLIKEN

MLF410@BELLSOUTH.NET

TELEPHONE 270-843-0800
FACSIMILE 270-842-1237

September 10, 2001

Ms. Jane C. Ruhl, P.E.
US Army Corps of Engineers
Louisville District
Post Office Box 59
Louisville KY 40201-0059

In Re: Greencastle Lock and Dams

Dear Ms. Ruhl:

I was glad to be able to be in attendance at the meeting last Wednesday concerning the Corps of Engineers recommendations concerning the various Locks and Dams located on Green and Barren Rivers.

I was also happy to learn, that after due consideration, you had agreed to change your recommendation concerning Barren River Lock and Dam number 1. You stated that your new recommendation would be that the Dam would be repaired by the Corps and retained. The Locks would be filled, and the property would be transferred to either Warren County or to some entity which would be created by Warren County in order that this Dam would remain in place.

We believe that this Dam at Greencastle is vital to this community and this area and we appreciate your being responsive to our sentiments in this regard.

Very Truly Yours,

MILLIKEN LAW FIRM



W. Currie Milliken
WCM/adj

C:\M L F\New Folder\CLIENTS\GreencastleDam\jane1.wpd

cc: Judge Executive Michael O. Buchanon
Warren County Attorney Michael Caudill
Esq. Doc Kaelin
Esq. Terry Stahl
Esq. Tony Payne
Esq. Tommy Hunt
Esq. Lonnie White
Esq. Robert Donoho
Mayor Sandy Jones
Commissioner Jim Bullington
Commissioner Joe Denning
Commissioner Dan Hall
Commissioner Alan Palmer
Hon. Brett Guthrie
Rep. Jody Richards
Mr. David Garvin
Mr. David Bradford
Dr. Jess Funk
Mr. Johnny D. Webb
Mr. Marshall Love
Edmonson County Attorney Gregory R. Vincent
Edmonson County Judge Executive N.E. Reed
Butler County Judge Executive David R. Martin
Butler County Attorney Bobby Wade
Bowling Green Land Mark Association
Editor Park City Daily News
Col. Robert E. Slockbower
Senator Mitch McConnell
Senator Jim Bunning
Representative Ed Whitfield
Representative Ron Lewis

CITY OF RUSSELLVILLE

City Hall • 168 S. Main Street • Russellville, KY 42276 • Phone 270.726.5000 • Fax 270.726.5008

Shirlee Yassney
Mayor

Ken Smith
Councilman

Gerald Chapman
Councilman

[illegible]ean Hankins
[illegible]ouncilwoman

Russell Jones
Councilman

Morris Kisselbaugh
Councilman

Howard Wren
Councilman

U.S. Army Corps of Engineers
Louisville District
Attn: CELRL – PM – PF (RUHL)
P.O. Box 59
Louisville, KY 40201-0059

August 2, 2001

To Whom It May Concern,

The U.S. Army Corps of Engineers has released a disposition study for Green River Locks and Dams 3,4,5, and 6 and Barren River Lock and Dam 1 that has a purpose other than supporting an adequate and stable water supply.

There is a great concern that we will not have an adequate and quality water supply for the individual communities of our region. Also, there is concern about the likelihood of flash flooding down stream, and the environmental concerns regarding waste disposal in dry riverbeds.

Russellville opposes any approval or adoption of the disposition study until the requirements for an adequate and stable water supply are assured and request that the U.S. Army Corps of Engineers be directed to perform their duties in the maintenance of these Locks and Dams.

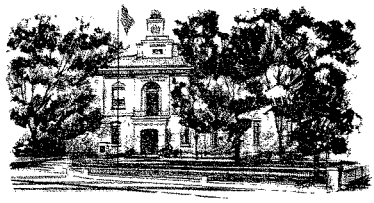
Thank you for your consideration in this matter.

Sincerely,

Shirlee Yassney

Mayor Shirlee Yassney
LSY8-02-01

Office Of
Logan County-Judge Executive
John H. Guion III



P.O. Box 365
Russellville, Kentucky 42276
Telephone 270-726-3116
Fax 270-726-3117

August 1, 2001

U.S. Army Corps of Engineers
Louisville District
Attn: CELRL-PM-PR (RUHL)
P.O. Box 59
Louisville, Ky 40201-0059

Dear Ms. Ruhl:

The U.S. Army Corps of Engineers has released a disposition study for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 that has a purpose other than supporting an adequate and stable water supply.

There is a great concern that we will not have an adequate and qualified water supply for the individual communities of our region. Also, there is concern about the likelihood of flash flooding downstream, and the environmental concerns regarding waste disposal in dry riverbeds.

Logan County opposes any approval or adoption of the disposition study until the requirements for an adequate and stable water supply are assured and request that the U.S. Army Corps of Engineers be directed to perform their duties in the maintenance of these Locks and Dams.

Thank you for your consideration in this matter.

Sincerely,

John H. Guion III
Logan County Judge/Executive

JHG/anw

MICHAEL O. BUCHANON
TEL: (270) 843-4146 WARREN COUNTY JUDGE EXECUTIVE FAX: (270) 781-2777

August 12, 2001

Ms. Jane Ruhl
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, KY 40201-0059

Dear Ms. Ruhl:

Warren County adopted the attached resolution opposing any approval or adoption of the disposition study released by the U.S. Army Corps of Engineers for Green River Locks and Dams 3,4,5, and 6, and Barren River Lock and Dam 1 until the requirements for a adequate and stable water supply are assured.

The Barren River Area has a great concern that an adequate stable water supply is essential to the growth and prosperity of the area. We are concerned that we will not have a sufficient and quality water supply for the individual communities in our region. Also a concern is the possibility of flash flooding down stream, and the environmental problems regarding waste disposal in dry riverbeds.

It is requested that the U.S. Army Corps of Engineers continue to perform their duties in the maintenance of these Lock and Dams.

Thank you for your help in this matter. If you need additional information, please let me know.

Sincerely yours,

MICHAEL O. BUCHANON
WARREN COUNTY JUDGE EXECUTIVE

MOB:ms

COMMONWEALTH OF KENTUCKY
WARREN FISCAL COURT
RESOLUTION NO. 21

RESOLUTION OPPOSING DEAUTHORIZATION OF LOCKS AND DAMS LOCATED ON THE GREEN AND BARREN RIVERS LOCATED BETWEEN BROWNSVILLE AND ROCHESTER, KENTUCKY AND LOCATED ON THE GREEN RIVER AT THE GREEN CASTLE, KENTUCKY ON THE BARREN RIVER

WHEREAS, in June, 2001, the United States Corps of Engineers published a "Navigation Disposition Study" pertaining to Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1, and

WHEREAS, it is expected that the recommendation of the United States Corps of Engineers will be for the deauthorization and or breaching of these locks and dams according to the Corps' Property Manager, Jane Ruhl, and

WHEREAS, many citizens and local government groups are in opposition to the Corps of Engineers recommendation pertaining to the Corps' plan, and

WHEREAS, the Barren River Area Development District, the Edmonson County Fiscal Court and the Morgantown City Council have all passed resolutions opposing said deauthorizations, and

WHEREAS, it is the opinion of the elected magistrates of the Warren Fiscal Court that the hereinabove locks and dams are necessary and essential to Warren and surrounding counties, and

WHEREAS, it is the opinion of the Warren Fiscal Court that relevant issues affecting the health safety and welfare of the regions citizens have not fully been considered, and

WHEREAS, issues such as flash flooding potential, waste water disposition, recreational usage and water supply sources are issues, which in the opinion of the Warren Fiscal Court have not been fully considered and analyzed, and

WHEREAS, it is the further opinion of the Warren Fiscal Court that the environmental assessment contained in Appendix E, Dated June 2001, is

incomplete and requires further study so as to insure protection of any and all endangered species and or historical resources.

NOW THEREFORE BE IT RESOLVED, by the Warren Fiscal Court of Warren County Kentucky:

1. That it joins in concurs and agrees with the heretofore past resolutions and Edmonson County, Butler County and the Barren River Area Development District Board of Directors. Said resolutions are in opposition to deauthorization and or breaching of said facilities;

2. That the Warren Fiscal Court hereby officially requests that prior to an official recommendation by the United States Corps of Engineers that further study and analysis be conducted addressing other potential and probable affects of deauthorization;

3. That in the alternative , if and when deauthorization is approved, the Warren County Judge Executive and the Warren County Attorney are hereby authorized and empowered to enter into cooperative agreements by and between Warren County, Kentucky and other counties and or by and between Warren County, Kentucky and other governmental or quasi governmental entities including but not limited to non-profit public purpose governmental entities. Said cooperative agreements shall be for the purpose of retaining the abovementioned locks and dams in their present or improved state;

4. That by this resolution the Warren Fiscal Court requests the Congress of the United States not to follow the recommendation of the United States Corps of Engineers, which would result in the deauthorization of the locks and dams mentioned hereinabove; and

5. That the United States Army Corps of Engineers shall be directed to perform their duty in the maintenance of these locks and dams

This the 3rd day of August, 2001.

Michael C. BUCHANNON
Warren County Judge Executive

582-H-1

OFFICE - 487-5505 HOME - 487-6382

Russell Young

Monroe County Judge Executive
P.O. Box 305
Tompkinsville, Kentucky 42167

July 31, 2001

U. S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P>O> Box 59
Louisville, KY 40201-0059

Dear Sirs:

With much concern, we are writing to question your recommended alternatives to the maintenance of the locks and dams on the Green and Barren Rivers. Your proposals appear to place a low priority on the maintenance of an adequate and stable water supply for the citizens of our area.

We feel there should be a federal interest in maintaining an adequate and stable water supply for the people. Until this domestic supply can be assured, we feel no action should be presented for Congressional authorization.

In the interim, the Corps should continue to perform the maintenance of these locks and dams, as is their duty.

In earlier stakeholders meetings, there was a clear expression that navigation should not be the sole concern of the Corps on the Green and Barren Rivers. The obligation to a domestic water supply was a recurring theme.

Respectfully, we request your reconsideration of the alternatives in your disposition study.

Sincerely,

Russell Young
Monroe County Judge/Executive

CITY OF
ADAIRVILLE, KY

P.O. Box 185
110 North Main Street • Adairville, KY 42202
(270) 539-6731 • Fax (270) 539-5503

July 30, 2001

U. S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P O Box 59
Louisville, KY 40201-0059

Dear Sirs:

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Respectfully, we request your reconsideration of the alternatives in your disposition study.

Sincerely,

Curtis M. Ramsey

Curtis M. Ramsey
Mayor

City of Edmonton

P.O. Box 374 • Edmonton, Kentucky 42129 Phone: 270-432-2811 Fax: 270-432-3949 E-mail: cityofed@scrtc.com

July 30, 2001

U.S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P. O. Box 59
Louisville, KY 40201-0059

Dear Sirs:

With much concern, we are writing to question your recommended alternatives to the maintenance of the locks and dams on the Green and Barren Rivers. Your proposals appear to place a low priority on the maintenance of an adequate and stable water supply for the citizens of our area.

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In earlier stakeholders meetings, there was clear expression that navigation should not be the sole concern of the Corps on the Green and Barren Rivers. The obligation to a domestic water supply was a recurring theme.

Respectfully, we request your reconsideration of the alternatives in your disposition study.

Sincerely,

Howard D. Garrett

Howard D. Garrett, Mayor

CC **U.S. Senator Jim Bunning**
316 Hart Senate Office Building
Washington, D.C. 20510

U.S. Senator Mitch McConnell
261A Russell Senate Building
Washington, D.C. 20510

U.S. Congressman Ed Whitfield
236 Cannon House
Washington, D.C. 20515

U.S. Congressman Ron Lewis
2418 Rayburn Building
Washington, D. C. 20515

City of Brownsville

P.O. Box 238
Brownsville, Ky. 42210-0238

JULY 30, 2001

U. S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P. O. Box 59
Louisville KY 40201-0059

Dear Sirs:

With much concern, we are writing to question your recommended alternatives to the maintenance of the locks and dams on the Green and Barren Rivers. Your proposals appear to place a low priority on the maintenance of an adequate and stable water supply for the citizens of our area.

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In the interim, the Corps should continue to perform the maintenance of these locks and dams, as is their duty.

In earlier stakeholders meetings, there was a clear expression that navigation should not be the sole concern of the Corps on the Green and Barren Rivers. The obligation to a domestic water supply was a recurring theme.

Respectfully, we request your reconsideration of the alternatives in your disposition study.

P.S. AS OF WORKING WITH THE CORP OF ENGINEER'S FOR OVER 50 YEARS THIS WOULD BE A TREMENDOUS EFFECT TO THE LOWER LOCK & DAM AND THE EDMONSON COUNTY WATER DISTRICT PUMPS WATER FROM THEIR AND THAT WOULD CAUSE THE DRINKING WATER TO BE UNHEALTHY AND UNSAFE.

SINCERELY,

EMO MEREDITH, MAYOR CITY OF BROWNSVILLE

Freddie L. Travis

BARREN COUNTY JUDGE/EXECUTIVE

P.O. Box 129
Glasgow KY 42142-0129

Telephone 270/651-3338
Fax 270/651-2844

July 31, 2001

U.S. Army Corps of Engineers
Louisville District
Attn: CELRL-PM-PF (RUHL)
P. O. Box 59
Louisville, Kentucky 40201-0059

Dear Sirs:

With much concern, I am writing to question your recommended alternatives to the maintenance of the locks and dams on the Green and Barren Rivers. Your proposals appear to place a lot priority on the maintenance of an adequate and stable water supply for the citizens of our area.

We feel there should be a federal interest in maintaining adequate and stable water supply for the people. Until this domestic supply can be assured, we feel no action should be presented for Congressional authorization.

In the interim, the Corps should continue to perform the maintenance of these locks and dams, as is their duty.

In earlier stakeholders meetings, there was a clear expression that navigation should not be the sole concern of the Corps on the Green and Barren Rivers. The obligation to a domestic water supply was a recurring theme.

Respectfully, we request your reconsideration of the alternatives in your disposition study.

Thank you for your attention to this letter of concern.

Very sincerely yours,

F.L. Travis

Freddie L. Travis
Barren County Judge/Executive

FLT/sjj

cc: Congressman Ed Whitfield, Congressman Ron Lewis,
Senator Jim Bunning, Senator Mitch McConnell

Metcalfe County Judge / Executive

M. Butler, II

100 East Stockton Street • Suite 3
Post Office Box 149
Edmonton, Kentucky 42129
Ph. 270-432-3181 • Fax 270-432-3726

August 3,2001

U.S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P.O. BOX 59
Louisville KY 40201-0059

Dear Sirs:

With much concern, we are writing to question your recommendation for alternatives to the maintenance of the locks and dams of the Green River and Barren River. It seems that your proposals appear to place a low priority on the future supply of stable and adequate water for the citizens in our area.

In prior meetings, there was an expression that navigation should not be the sole concern of the Corps of Engineers on the Green and Barren Rivers. Our citizens have great concerns about the possibility of flash flooding down stream and the environmental concerns regarding waste disposal in dry riverbeds. We feel there should be Federal interest in maintaining quality water for our people.

Metcalfe County Government and Metcalfe County citizens oppose any approval or adoption of the disposition study until the requirements for an adequate and stable water supply are assured. We, as Metcalfe County residents, request that the U.S. Army Corps of Engineers be directed to perform their duties in the maintenance of these Locks and Dams.

Thank you for your time and consideration in this matter, with kindest personal regards I remain,

D.M. Butler, II
Judge/Executive
Metcalfe County

DMBII/lfr

Charles W. Hays
Mayor

ta Sims,
lerk

City of Munfordville
P.O. Box 85
Munfordville, Kentucky 42765
Ph. (270) 524-5701
Fax (270) 524-3021

COUNCIL
Mary W. Mills
Robert Nash
Daryl Miles
Patricia Wright
Chip Wilcoxson
Harvey Branstetter

AUGUST 7, 2001

U. S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P. O. Box 59
Louisville KY 40201-0059

Dear Sirs:

With much concern, we are writing to question your recommended alternatives to the maintenance of the locks and dams on the Green and Barren Rivers. Your proposals appear to place a low priority on the maintenance of an adequate and stable water supply for the citizens of our area.

We feel there should be a federal interest in maintaining an adequate and stable water supply for the people. Until this domestic supply can be assured, we feel no action should be presented for Congressional authorization.

In the interim, the Corps should continue to perform the maintenance of these locks and dams, as is their duty.

In earlier stakeholders meetings, there was a clear expression that navigation should not be the sole concern of the Corps on the Green and Barren Rivers. The obligation to a domestic water supply was a recurring theme.

Respectfully, we request your reconsideration of the alternatives in your disposition study.

Sincerely,

Charles W. Hays, Mayor
City of Munfordville

A RESOLUTION

WHEREAS AN ADEQUATE, STABLE WATER SUPPLY IS ESSENTIAL to the well-being, the continued growth and the prosperity of the Barren River Area; and

WHEREAS THE U. S. ARMY CORPS OF ENGINEERS has released a disposition study for Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 that has a purpose other than supporting an adequate and stable water supply;

NOW THEREFORE BE IT RESOLVED THAT THE CONGRESSIONAL VOICE for the 36 local governments included in the BARREN RIVER AREA DEVELOPMENT DISTRICT, and the citizens they serve, oppose any approval or adoption of the disposition study until the requirements for an adequate and stable water supply are assured, and

BE IR FURTHER RESOLVED THAT THE U. S. ARMY CORPS OF ENGINEERS be directed to perform their duties in the maintenance of these Lock and Dams.

Adopted this 23rd day of July, 2001 by the Board of Directors of the Barren River Area Development District.

And Adopted this 6th Day of August 2001 by the Munfordville City Council

Charles W. Hays, Mayor

ATTESTED: Rita Sims

Rita Sims, Clerk

OFFICE OF THE
WARREN COUNTY
JUDGE EXECUTIVE

Michael O. Buchanon
Warren County Judge Executive

429 East Tenth Street
Bowling Green, Kentucky 42101
Office: 270-843-4146
Fax: 270-781-2777

Michael E. Caudill
Warren County Attorney

James "Doc" Kaelin
Magistrate • District 1

Terry Stahl
gistrate • District 2

Tony Payne
Magistrate • District 3

Tommy Hunt
Magistrate • District 4

Lonnie White
Magistrate • District 5

Robert Donoho
Magistrate • District 6

*An Equal
Opportunity Employer*

August 10, 2001

U. S. Core of Engineers
Louisville District
Attention C.E.L.R.L-P.F. (Ruhl)
P. O. Box 59
Louisville, KY 40201-0059

Re: Resolution # 21

Dear Sir:

Enclosed you will find the above referenced Resolution opposing deauthorization of locks and dams located on the Green and Barren Rivers located between Brownsville and Rochester, Kentucky and located on the Green River at the Green Castle, Kentucky on the Barren River.

Warren Fiscal Court unanimously passed this resolution on the 3rd day of August 2001.

Should you need additional information, kindly let me know.

Sincerely yours,

Sue Greathouse
Fiscal Court Clerk

Enclosure

COMMONWEALTH OF KENTUCKY
WARREN FISCAL COURT
RESOLUTION NO. 21

RESOLUTION OPPOSING DEAUTHORIZATION OF LOCKS AND DAMS LOCATED ON THE GREEN AND BARREN RIVERS LOCATED BETWEEN BROWNSVILLE AND ROCHESTER, KENTUCKY AND LOCATED ON THE GREEN RIVER AT THE GREEN CASTLE, KENTUCKY ON THE BARREN RIVER

WHEREAS, in June, 2001, the United States Corps of Engineers published a "Navigation Disposition Study" pertaining to Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1, and

WHEREAS, it is expected that the recommendation of the United States Corps of Engineers will be for the deauthorization and or breaching of these locks and dams according to the Corps' Property Manager, Jane Ruhl, and

WHEREAS, many citizens and local government groups are in opposition to the Corps of Engineers recommendation pertaining to the Corps' plan, and

WHEREAS, the Barren River Area Development District, the Edmonson County Fiscal Court and the Morgantown City Council have all passed resolutions opposing said deauthorizations, and

WHEREAS, it is the opinion of the elected magistrates of the Warren Fiscal Court that the hereinabove locks and dams are necessary and essential to Warren and surrounding counties, and

WHEREAS, it is the opinion of the Warren Fiscal Court that relevant issues affecting the health safety and welfare of the regions citizens have not fully been considered, and

WHEREAS, issues such as flash flooding potential, waste water disposition, recreational usage and water supply sources are issues, which in the opinion of the Warren Fiscal Court have not been fully considered and analyzed, and

WHEREAS, it is the further opinion of the Warren Fiscal Court that the environmental assessment contained in Appendix E, Dated June 2001, is

incomplete and requires further study so as to insure protection of any and all endangered species and or historical resources.

NOW THEREFORE BE IT RESOLVED, by the Warren Fiscal Court of Warren County Kentucky:

1. That it joins in concurs and agrees with the heretofore past resolutions and Edmonson County, Butler County and the Barren River Area Development District Board of Directors. Said resolutions are in opposition to deauthorization and or breaching of said facilities;

2. That the Warren Fiscal Court hereby officially requests that prior to an official recommendation by the United States Corps of Engineers that further study and analysis be conducted addressing other potential and probable affects of deauthorization;

3. That in the alternative , if and when deauthorization is approved, the Warren County Judge Executive and the Warren County Attorney are hereby authorized and empowered to enter into cooperative agreements by and between Warren County, Kentucky and other counties and or by and between Warren County, Kentucky and other governmental or quasi governmental entities including but not limited to non-profit public purpose governmental entities. Said cooperative agreements shall be for the purpose of retaining the abovementioned locks and dams in their present or improved state;

4. That by this resolution the Warren Fiscal Court requests the Congress of the United States not to follow the recommendation of the United States Corps of Engineers, which would result in the deauthorization of the locks and dams mentioned hereinabove; and

5. That the United States Army Corps of Engineers shall be directed to perform their duty in the maintenance of these locks and dams

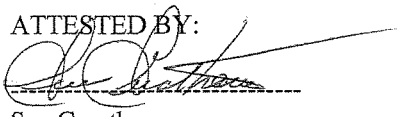
This the 3rd day of August, 2001..

Mike Buchanan

Michael O. BUCHANNON
Warren County Judge Executive

Passed by vote of 7 to 0

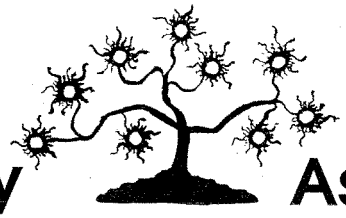
ATTESTED BY:



Sue Greathouse
Warren Fiscal Court Clerk

PREPARED BY:

MICHAEL E. CAUDILL
AMY HALE MILLIKEN
Warren County Attorney's Office
1001 Center Street, Suite 206
Bowling Green, KY 42101



Soft Energy Associates

Renewable Energy Development and Consulting

August 13, 2001

Ms. Jane Ruhl
U.S. Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P.O. Box 59
Louisville, KY 40201-0059

Dear Ms. Ruhl,

Soft Energy Associates appreciates the opportunity to comment on the Corps of Engineers plans to dispose of the Green River and Barren River dams. A copy of our comments is attached. Soft Energy Associates is Kentucky's only developer of hydro-electric projects. For years we have investigated the development of the Green River and Barren River dams for electric generation, using the lock chambers to dramatically lower construction costs. We have not pursued these projects since we feared that like the Kentucky River, residents held out hope that the locks would be repaired and once again used for navigation. But the plans put forth by the Corps make it clear that these lock chambers will not be rebuilt for navigation but will be filled with gravel. By the Corps resolving this issue, we feel the time is now right to develop these sites for hydro-electric generation.

Hydro-electric development at Green River Lock and Dam 3 and 5, and Barren River Lock and Dam 1 could add over 5 Megawatts of clean renewable power generation to our state. Instead of the Corps spending about $10 millions to "modify" these sites for safety reasons, private money could be used to put turbines in the lock chambers and make the sites safe for local fishermen. We believe that these sites are not a liability but a great asset for southern Kentucky for water supply, recreation, and power generation. Whether the Corps retains the properties or disposes of them, the structures should be left intact for the benefit of the citizens of Kentucky.

Soft Energy Associates stands ready to work with the Corps of Engineers or any new owner to develop these three sites. We have already begun the process by applying for a FERC Preliminary Permit on the two sites presently available. Please let us know if we can answer any questions or provide you with any additional information.

Sincerely,

David Brown Kinloch
President, Soft Energy Associates

414 South Wenzel Street • Louisville, KY 40204 • 502-589-0975

PROPOSED DISPOSAL OF GREEN RIVER LOCK AND DAM 3-6 AND BARREN RIVER LOCK AND DAM 1

COMMENTS OF SOFT ENERGY ASSOCIATES

The U.S. Army Corps of Engineers has developed a plan to dispose of Lock and Dam 3 through 6 on the Green River and Lock and Dam 1 on the Barren River. These structures were built for navigation of these rivers and have not been used for this purpose in many years. The Corps of Engineers has drawn up detailed plans to modify these structures and then dispose of these properties. Soft Energy Associates appreciates the opportunity to comment on these plans.

In general, the plan calls for filling all lock chambers with gravel, breaching two of the dams, and removing structures on the properties. While we appreciate the Corps of Engineers' efforts to leave these properties in a state that will minimize danger to the public, we feel that the best options for these resources were not considered, probably because they were beyond the usual options considered by the Corps.

The Corps must recognize that these properties constitute a valuable resource for southern Kentucky for water supply, transportation and recreation. These structures also offer a valuable opportunity for the generation of clean electricity for this part of the Commonwealth of Kentucky. Unfortunately, the plans drawn up by the Corps would first destroy many of these resources then dispose of them. These plans are clearly not in the best interest of the citizens of southern Kentucky. Instead of requesting $12,749,800 to waste on destroying these resources, the Corps of Engineers should propose to the U.S. Congress to simply change its authorization from navigation to maintain these public resources for water supply and recreation. The cost of annual maintenance of these resources would be a small fraction of the money sought to destroy them, only $50,000 per year for the 5 dams. It should be noted that the Corps could maintain the sites at this cost for 255 years before the cost would exceed the cost of destroying and disposing of the property. The best option as outlined in the disposal study is "Alternative 1, No Action". This alternative was rejected due to the danger associated with falling from the lock wall. This risk and liability for the Corps can be eliminated if the sites are developed for hydroelectric generation and the lock chambers are used for turbines and made safe.

Whether the Corps of Engineers changes its authorization and retains ownership, or disposes of these properties, the proposed plan to modify these structures constitutes an expensive waste of money that would destroy a valuable resource of southern Kentucky. The plan put forth would fill the lock chambers with gravel, for safety reasons. The lock chambers offer a unique opportunity to add hydro-electric turbines to these dams at a very affordable cost. Instead of expensive dam modification required to add turbines, the lock chambers offer a way to add turbines with minimal civil costs. Our nation is presently in an energy crisis. President Bush has directed federal facilities to maximize energy production. The Corps plan to destroy the electric generation potential of these federal resources seem contrary to the President's directive. Even worse, the Corps' plan would destroy the potential of these resources, then

dispose of the destroyed resources onto the local public. We understand that the options that the Corps can propose are limited, but it would be better to dispose of the properties without destroying them, and save the American taxpayer over $12 million. "Alternative 2, Disposal without alternations to structures" was rejected since it was judged that "Without alterations to structures, it is not likely that a party interested in ownership would be found". Nothing could be further from the truth. If the structures are destroyed and rendered unusable for hydro-electric production, it is unlikely that dams in a useless condition would find a purchaser. While Alternative 1 is clearly the best option, Alternative 2 is clearly the most attractive option if the Corps of Engineers disposes of the properties.

Our comments will now address the plans for each of the five structures individually. Obviously, Green River Lock and Dam 4 has no hydro-electric potential since the dam is breached. We have no problem with filling the lock chamber with gravel at the useless site. But the other four dams each have substantial potential to be used to generate clean renewable electricity, though the potential varies for each of the sites.

The site which is most marginal for hydro-electric development is Green River Lock and Dam 6. If the lock and dam are in as bad of shape as represented in the Disposal Study, investment in hydro-electric equipment at this site without significant repairs would be difficult to justify. The cost of hydro-electric development in this part of the country requires optimum sites due to the low cost of power in the region. It is unlikely that a hydro-electric project could afford both new generating equipment and significant dam repairs. In addition, the impact of the site on Mammoth Cave would make licensing such a project difficult. Thus hydro-electric development at Lock and Dam 6 is not feasible, unless a commitment is made by other parties to repair the site structures.

Probably the most attractive site for hydro-electric development is Barren River Lock and Dam 1. Like Green River Lock and Dam 5, Barren River 1 has a very high head potential due to the loss of Dam 4. This dam is slightly more attractive than Dam 5 due to easier access to the site. There is though a problem with the Barren River 1 site. The Disposal Study recommends breaching this dam. We believe this would be major mistake and a tremendous waste of a valuable resource. This site has the potential for a 2 Megawatt hydro-electric project, which could generate 8,000,000 kilowatt-hours per years (enough for 1000 homes). This clean power could eliminate 15,000,000 pounds of carbon dioxide per year (global climate change emissions) and 177,000 pounds of sulfur-dioxide per year (acid rain emissions). The Disposal Plan talks about the possibility of canoeists using the river if the dam is breached. But the hearing at the Butler County High School proved that many fisherman with motorized boats use this pool and are opposed to breaching this dam. The Corps would destroy the currently used recreational use for a possible use by others if the dam is destroyed. We do not intend to stand in the way of the will of the local residents if they want the dam breached. But it appears the local residents do <u>not</u> want the dam breached and want the pool preserved for fishing and boating with motorized boats. In addition, the Corps would waste over $3 million to destroy this valuable resource. If the Corps decides to listen to the will of local residents and not destroy the Barren River Dam 1, the lock chamber should also not be destroyed by filling it with rock. Soft Energy Associates would be more than willing to develop this site with hydro-electric turbines if the Corps does not

breach the dam. A FERC Preliminary Permit for the site is currently held by Universal Electric. This permit will expire in about a year, and it is evident that Universal Electric is making no effort to investigate development. If the Corps abandons the concept of breaching the dam, we will move immediately after the Universal Electric permit expires to work on development of the site.

The other extremely attractive site for hydro-electric development is Green River Lock and Dam 5. The Corps plans are to leave this dam for water supply, but fill the lock chamber with gravel and demolish the operations building. This would be a tragic waste of almost $2 million dollars that would also destroy this valuable resource. Instead of filling the lock chamber with gravel, we instead propose to fill the locks with hydro-electric generating equipment and make the site safe for local fishermen. The operations building on site would be very valuable for housing hydro-electric control equipment and should not be removed. Soft Energy Associates believes that this site can be economically developed for hydro-electric generation. Like Barren River 1, this site has the potential for a 2 Megawatt hydro-electric project, which could generate 8,000,000 kilowatt-hours per years (enough for 1000 homes). This clean power could eliminate 15,000,000 pounds of carbon dioxide per year (global climate change emissions) and 177,000 pounds of sulfur-dioxide per year (acid rain emissions). Soft Energy Associates is moving ahead with the development of this site. On July 26, 2001, we applied with the Federal Energy Regulatory Commission for a Preliminary Permit for this site. A copy of that application is attached to these comments. Obtaining a Preliminary Permit is the first necessary step in development of a site. Soft Energy Associates intends to move as quickly as possible on development of this site. We urge the Corps of Engineers not to destroy any of the valuable structures at Lock and Dam 5. We estimate that a 2 Megawatt hydro-electric development can be constructed at a lower cost than the Corps would spend to destroy this site. We stand ready and willing to work with the Corps of Engineers or any new owner on development of the site. If no governmental purchaser can be located, we would consider purchasing the site at a reasonable cost, as long as the access to the property is included in the sale.

The final attractive site for hydro-electric development is Green River Lock and Dam 3. This site is not nearly as attractive as the other two sites due to the lower head and smaller lock chamber. The site would only allow a 1.2 Megawatt hydro-electric project. Though smaller, this site would still generate 4,000,000 kilowatt-hours per years (enough for 500 homes). This clean power could eliminate 7,500,000 pounds of carbon dioxide per year (global climate change emissions) and 88,500 pounds of sulfur-dioxide per year (acid rain emissions). The site does have some attractive features though. The site has a good road that runs up right next to the lock chamber. In addition, a strong three-phase distribution runs along the Rochester side of the river allowing for easy interconnection. While this would be a smaller project, it is still very attractive. Soft Energy Associates believes that this site can be economically developed for hydro-electric generation. Like at Dam 5, the Corps proposes to leave the dam but destroy the site by filling the lock chamber with gravel and removing buildings on the site. The Corps proposes to waste almost $5 million to destroy this resource. For about one third this cost, the site can be made safe by using the lock chamber for a hydro-electric project. Instead of filling the lock chamber with gravel, we instead propose to fill the locks with hydro-electric generating equipment and make the site safe for local fishermen. The buildings on site would be very

valuable for housing hydro-electric control equipment and should not be removed. Soft Energy Associates is moving ahead with the development of this site. On July 26, 2001, we applied with the Federal Energy Regulatory Commission for a Preliminary Permit for this site. A copy of that application is attached to these comments. Obtaining a Preliminary Permit is the first necessary step in development of a site. Soft Energy Associates intends to move as quickly as possible on development of this site. We urge the Corps of Engineers not to destroy any of the valuable structures at Lock and Dam 3. We stand ready and willing to work with the Corps of Engineers, or any new owner, on development of the site. If no governmental purchaser can be located, we would consider purchasing the site a at reasonable cost.

In summary, we believe the best option is "Alternative 1", the no action plan. The Corps can and should continue to own and maintain these sites. If the Corps does dispose of these properties, "Alternative 2", disposal without modification, should be used for Green River 3, Green River 5 and Barren River 1. Alternative 2 for these three sites would save taxpayers about $10 million, or about 80% of the proposed disposal cost. In addition, Alternative 2 would preserve these valuable resources for development to produce clean renewable power. Soft Energy Associates is moving ahead with developing the two Green River sites, and will work on the Barren River site if the Corps drops its plan to destroy this resource. We stand ready to work with the Corps or any new owners to develop these sites. If no governmental owner can be found, we are willing to consider the purchase of these sites. We urge the Corps to work with us or any other interested hydro-electric developer to take advantage of these valuable resources instead of wasting taxpayer money to destroy them.



July 3, 2001

Ms. Jane Ruhl
U.S. Army Corps of Engineers
P. O. Box 59
Louisville, KY 40201-0059

Dear Ms. Ruhl,

Please accept this letter as one who opposes the Corps of Engineers' plan to destroy the locks on Green and Barren River in our area.

Here in Bowling Green we have a somewhat aggressive plan to develop our riverfront area, to make it eye appealing and add to the quality of life of our residents. As you might expect, if our locals like it, so probably will visitors.

It would be a sad day if, after millions of dollars are spent on this effort, this is only a small stream, or, heaven forbid, only a mudhole to view from the river bank above.

According to people who know more about these kinds of things than I do, this is not only a possibility but a probability.

I would like for the Corp to build up, not tear down. These locks have been neglected far too long and impact far too many people. The Green and Barren Rivers deserve to be utilized by not just a few, but as many people as possible.

Let people canoe the river. Let people fish the river. Let people float the river. And yes, let people just look at the river.

Please make sure there's still a river.

Sincerely,

Gary P. West
Executive Director

cc: Sen. Mitch McConnell
Rep. Ron Lewis
Daily News, Mr. Pipes Gaines

352 Three Springs Road • Bowling Green, KY 42104-7519 • Phone 270-782-0800 • Fax 270-842-2104

BUTLER COUNTY WATER SYSTEM INC.

July 10, 2001

MS JANE RUHL
U S ARMY CORPS OF ENGINEERS
ATTN: CELRL-PA
P O BOX 59
LOUISVILLE KY 40201-0059

Dear Ms. Ruhl:

The Butler County Water System, Inc. (BCWS) requests the Corps of Engineers to reconsider their proposal to dispose of Lock and Dam 3 on Green River at Rochester, Kentucky.

Enclosed is a copy of a letter to Herbert S. Harback, Commissioner and District Engineer at the Corps of Engineers dated October 21, 1993 and a copy of a Resolution of the BCWS Board of Directors dated October 19, 1993. The position of BCWS has not changed. We are still withdrawing water from the river pool created as a result of Lock and Dam 3. The BCWS now serves 4,300 homes, farms, schools, commercial, and industrial business in Butler County.

The County Government and BCWS do not have the means and ability to maintain a Dam as the Corps of Engineers has proposed. The maintenance of the Dam is extremely important to the existing and future water supply for Butler County. The loss of the pool of water which our water system utilizes to treat and distribute to Butler County homes and other water users would create a very serious health hazard, loss of many jobs and would be a complete disaster for the entire County.

The Corps of Engineers has the knowledge and ability to properly maintain the Dam and should continue to do so.

If we can provide you with any additional information or assistance, please let us know.

Sincerely,

Joe Liles
General Manager

Enclosures

c: Honorable Mitch McConnell
Honorable Jim Bunning
Honorable Ed Whitfield
Honorable Ron Lewis
Honorable Hugh Evans

QUALITY ON TAP

523 US HWY 31-W BYPASS
PO BOX 10180
BOWLING GREEN, KY 42102-4780
TEL 270.842.0052 FAX 270.842.8360

104 S. TYLER STREET / SUITE B
PO BOX 1488
MORGANTOWN, KY 42261
TEL 270.526.4656 FAX 270.526.5397

Butler County Water System, Inc.

WARREN RECC BUILDING / 951 FAIRVIEW AVE. / P. O. BOX 1118
PHONE 502-842-0052
FAX 502-781-3299
BOWLING GREEN, KENTUCKY 42102-1118

October 21, 1993

MR HERBERT S HARBACK
COMMISSIONER AND
DISTRICT ENGINEER
U S ARMY ENGINEERING DISTRICT
CORPS OF ENGINEERS
PO BOX 59
LOUISVILLE KY 40201-0059

Dear Mr. Harback:

Butler County Water System, Inc. (System) has a permit (No. 199101743) to withdraw water from a raw water intake pipe on the left bank of Green River at mile 142.7 near Morgantown, KY. We have become concerned about the deteriorating condition of the Rochester Dam and the high probability that if the deterioration continues, the dam could be washed out thereby losing the pool of water which our System utilizes to treat and distribute to the 2,564 residents and industries of Butler County. The loss of the System's water supply would create a very serious health hazard for the residents and the loss of many jobs.

Enclosed is a copy of the Resolution of Butler County Water System, Inc. requesting the Department of Army, U.S. Army Corps of Engineers to take whatever action necessary to protect, preserve, and assure an adequate raw water supply is maintained and available from Green River above the Rochester Dam at the water intake site of our System.

It is our understanding the U.S. Army Corps of Engineers is presently conducting a study concerning the Rochester Dam. In reaching a final decision and recommendation, we request the engineers consider the importance of water and our System's ability to obtain water from Green River for the residents of Butler County.

If we can provide you with any additional information or be of any assistance, please do not hesitate to let us know.

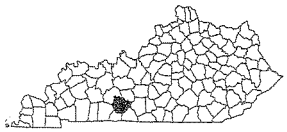
Sincerely,

Joe Liles

Joe Liles
Manager

JL:rsj
Enclosure

C: The Honorable Wendell Ford, United States Senator
The Honorable Mitch McConnell, United States Senator
The Honorable Tom Barlow, United States House of Representatives
The Honorable William Natcher, United States House of Representatives
The Honorable David Martin, County Judge Executive - Butler County
Mr. Jack Eversole, Barren River Area District Development



LOCATION IN KENTUCKY

WARREN COUNTY CONSERVATION DISTRICT

925 Lovers Lane Phone: 846-4506

BOWLING GREEN, KENTUCKY 42103-7140

SUPERVISORS
Garnett Owens, Chairman
Brent Travelsted, Vice-Chairman
L.E. Smith, Secretary-Treasurer
Noel Hill, Member
Orville W. "Pete" Dotson, III, Member
Donald Elkin, Member
Phil Simon, Member
Beverly Buchanan, Program Specialist
Gary Vincent, Resource Technician

August 15, 2001

Ms. Jane Ruhl
Army Corp of Engineers
P.O. Box 59
Louisville, KY 40201

Dear Ms. Ruhl:

The purpose of this correspondence is to express our opposition to the removal of five locks and two dams on the Green and Barren Rivers in south-central Kentucky. The Green River borders the northern portion of Warren County and Barren River dissects the County. Barren River provides drinking water for approximately 100,000 stakeholders. The dams prevents large acreage of farmland near these river basins from flooding and also serves as a reservoir for our drinking water supply.

To remove these locks and dams would be an expensive undertaking. We would prefer using these resources for needed repairs. The Conservation District has been hard pressed to find any advantages for taking such drastic actions.

As a special district that is governed by Kentucky State Statute, we urge the Corps to reconsider this proposal. Thanks in advance for your consideration of this matter.

Sincerely,
Warren County Conservation District Supervisors









Garnett Owens, Chairman

Donald Elkin, Member

Noel D. Hill, Vice-Chairman

Darrell Cohron, Member

L.E. Smith, Secretary-Treasurer

James Philip Simon, Member

Orville Dotson, III , Member

cc: Honorable Ron Lewis
Honorable Mitch McConnell
Honorable Jim Bunning
Rick McCue, General Mgr. W.B.K.O. TV

Published by News Publishing LLC

Park City Daily News

813 College St. P.O. Box 90012 Bowling Green, KY 42102-9012

July 19, 2001

Army Corps of Engineers
ATTN Jane Ruhl
P O Box 591
Louisville KY 40201-0059

Dear Mrs. Ruhl:

Please count me among those who are strongly opposed to the Corps of Engineers' plans for the locks and dams on Green and Barren River.

In particular, I oppose the destruction of lock and dam 6 in Brownsville and lock and dam 1 at Greencastle. The negative implications of the resulting lower water levels on recreation, water supply, and ferries in this region are troubling. I am also opposed to any plan that does not include maintaining the dams at Rochester and Glenmore.

The possibility of lower water levels at Bowling Green's planned river walk which recently received both federal and state grants is also a matter of great concern.

You may be interested in knowing that the newspaper with which I am associated reported recently that water levels at one of the Edmonson County ferries had become sufficiently low that it could no longer ferry trucks.

Please find enclosed the lead editorial from our newspaper's June 30 edition, which makes quite clear our views on this matter.

It certainly does frustrate me, Mrs. Ruhl, when I consider that many years of neglect of these structures by the Corps may be one of the underlying reasons that your agency is now promoting their destruction.

The dams and the water levels they maintain are important to this region. The Corps should maintain them, not destroy them.

Very truly yours,

Pipes Gaines
Publisher

PG/kr
Enclosure

City of Rochester

Rochester, Ky. 42273

)ffice of Mayor 934-2000

August 20, 2001

U.S Army Corps of Engineers
Louisville District
ATTN: CELRL-PM-PF (RUHL)
P.O. Box 59
Louisville KY 40201-0059

Dear Sirs:

With much concern, we are writing to question your recommended alternatives to the maintenance of the locks and dams on the Green and Barren Rivers. Your proposals appear to place a low priority on the maintenance of an adequate and stable water supply for the citizens of our area.

We feel there should be a federal interest in maintaining an adequate and stable water supply for the people. Until this domestic supply can be assured, we feel no action should be presented for Congressional authorization.

In the interim, the Corps should continue to perform the maintenance of these locks and dams, as is their duty.

In earlier stakeholders meetings, there was a clear expression that navigation should not be the sole concern of the Corps on the Green and Barren Rivers. The obligation to a domestic water supply was a recurring theme.

Respectfully, we request your reconsideration of the alternatives in your disposition study.

approved 8-20-01
Rochester city Council
Horace Hammers, Mayor

copy Congressmen + Senators

8-9-01

JANE C. RUHL,
DEPT. OF THE ARMY, U.S.
ARMY ENGINEER DIST.
LOUISVILLE CORP OF ENGINEERS
P.O. BOX 59, LOUISVILLE, KY.
40201-0059.

DEAR MS. RUHL:

I WILL STATE TWO POINTS:

1) BEFORE THE RIVER IS RETURNED BACK TO THE PEOPLE, IT SHOULD BE IN THE SAME CONDITION AS IT WAS WHEN THE CORP OF ENGINEERS PROPERLY MAINTAINED IT. EITHER WAY IT WILL REFLECT HOW GOOD OF STEWARDS THE CORP. IS FOR THE PEOPLE. PLEASE DECIDE BY LOOKING TO THE FUTURE + NOT TO THE PAST.
2) NEXT, IF AFTER GOING THROUGH THE DISPOSAL PROCESS, IT GETS TO THE LAST STEP WHERE INDIVIDUALS OR GROUPS (ENVIRONMENTAL) CAN ASSUME OWNERSHIP. WHAT'S TO KEEP THEM FROM REMOVING THE DAMS ANYWAY TO RETURN THE RIVER TO THE PRE-LOCK + DAM HISTORY?

THANKS,

126 Sunset Loop
Morgantown, Ky 42261

July 24, 2001

To: U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-9889
Attn. CELRL-PM-PF (RUHL)

From: Doris A. Tichenor
1086 Annis Ferry Road
Morgantown, KY 42261

Doris A. Tichenor

Carroll B. Tichenor

Carroll B. Tichenor

RE: Corps of Engineers Proposal Regarding Dams #3, 4, 5 and 6 on Green River

My husband and I own a farm on Green River at Mile Markers 134-135. This property has been owned by my family since 1904. We have been farming the river bottomland and closely monitoring the river since 1976.

Over the past 23 years we have observed greatly increased bank erosion and slippage on this stretch of the river, resulting in an increasingly wider, shallower pool with many 'stick-ups' due to large and small trees slipping into the river with large chunks of land. These conditions have worsened since the Rochester locks were closed and Dam #3 was placed in caretaker status in 1981. Because the locks are no longer opened and Corps of Engineers dredging of the channel has ceased, the normal flow of the river is permanently obstructed. Silt from upstream, together with soil and debris from bank slippage, is rapidly filling the river channel. If the Rochester dam remains, it seems reasonable to predict that the channel will eventually fill with silt to the level of the top of the dam. The six water intakes along Butler and Ohio County sections of the river will then be buried in mud and silt. Farms along the banks will continue to lose land and the flood plain will become wider and shallower.

Based on these observations, we think it would be better if Dams 3, 4, and 5 as well as Dam 6 were removed and the natural flow of the river were restored. However, it is clear that a storm of local opposition would be raised if such an action were even suggested, let alone became a real possibility. There is a local nostalgic memory of how the river used to be when the locks were in operation and the Corps was doing regular dredging. Even though most people realize these times are past and won't be returning, the perception remains that 'if only' the Corps would restore the locks and dams the problems would cease to exist.

We understand and agree with the position of Butler County citizens and officials that a dependable present and future water supply is of primary concern. We use the water, too, and we would not support any action or project that would further jeopardize the quantity or quality of our County's water supply. But the water supply is already in jeopardy and we recognize that the present situation needs to be addressed before a serious water crisis develops.

It seems to us that a comprehensive study needs to be made to more clearly identify the problems of the river and the dams (including water supply!) and to look at some possible alternatives for addressing these problems. Millions of dollars were spent in the past in an effort to justify a high dam at Mining City. Thankfully the effort failed and this disastrous project seems to have passed into well-deserved oblivion. The expenditure of some additional Federal dollars on an unbiased study of current problems and alternatives would be a good investment in the future economy and long term well-being of this region.

Following are some questions that might be included in the design of such a study:

What historic data exists concerning the minimum and maximum flow of water in this stretch of Green River? (This data should be available from the U.S. Geological Survey.) What are the present and anticipated quantities of water being taken from the river through the existing intakes? Or, what is the present usage of water by municipalities and rural districts in this region? How does flow compare with use? Is the existing pool behind Rochester dam actually necessary to meet water supply needs or is the dam part of the problem? How rapidly is the channel silting up? (Compare present depths with past depths.) What are the causes of the serious bank erosion now occurring along this stretch of the river? How would this problem be affected by removal of the dams?

Another consideration that could be examined in the study is the existence of three large reservoirs -- Barren, Green, and Nolin on the Green River and its upstream tributaries, holding vast amounts of water. If Dams 3, 4 and 5 were removed, could an agreement be reached with the Corps to release sufficient water from these reservoirs, on a timely basis, to meet the water supply requirements of Butler and adjoining counties? Has a similar arrangement been worked out anywhere else? Are there other municipalities along other rivers in Kentucky or elsewhere whose citizens have been confronted with the issue of obselete dams and what to do with them? How are these municipalities approaching the problem and what solutions have been found?

These may or may not be the right questions. In any case, we are sure there are reasonable questions that could be asked. We are simply suggesting that both the Corps proposal and the chorus of objections to it are short-sighted and limited in scope.

In addition, I would like to comment on a few specific aspects of the Corps proposal:

1. I strongly support the removal of the Brownsville Lock and Dam #6, regardless of what is done with the others. Drafts of this proposal have been under consideration for several years, and, unlike some of the other parts of the Corps proposal, have been thoroughly studied. The removal has been a goal of the Green River Bioreserve STrategic Plan since its inception, and with other measures being taken, will restore natural hydrology and biotic communities to the upper Green River and base level caves in Mammoth Cave National Park.

Comments, continued:

2. I do not support the part of the proposal that would transfer ownership of the dams to other Federal, State or local agencies or offer them for sale to private purchasers. I don't see any other agencies that have the expertise or the mandate to manage waterways for the public benefit and protection. And I think private ownership, even if proved legal, would be potentially disastrous. The interests of the public would be highly unlikely to be protected by a private owner, if these interests in any way conflicted with the owner's economic interests.

3. With regard to the other parts of the proposal, I recommend that further action be delayed until a more adequate study is made of the alternatives and potential consequences. I urge that the Corps ask Congress to authorize and fund such a study. Though I am not familiar with the details, I understand that a Section 729 Basin Study has been authorized for the Upper Green River Basin. Is it possible that additional funding could be authorized so this study could be expanded to include this section of the Lower Green River?

I appreciate this opportunity to offer my views and will appreciate your consideration of these suggestions and recommendations.

July 31, 2001

U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-9889
Attn: CELRL-PM-PS (Ruhl)

U.S. Army Corps of Engineers:

I am a life long resident of Rochester, Kentucky. My family farms in the river bottoms above Lock and Dam No. 3. I am writing to solicit your support to maintain the dam at Rochester. I understand that the chances for a resurgence of commercial navigation are slim, however, we depend on the Green River for our water supply. If the dam were to fail, it would endanger our water supply. Not to mention the loss of waterfowl habitat and recreational fishing on the river.

I believe that the U.S. Corps of Engineers is the only agency that has the expertise to maintain the dam as it should be. The Corp has suggested that the lock and dam be turned over to Butler County or some other entity. County governments simply do not have the expertise or resources to maintain this type of structure. Therefore, I strongly oppose the transfer of responsibility from the U. S. Corps of Engineers to any other entity.

I urge the Corp to please reconsider any measure that would transfer responsibility from the U.S. Army Corp of Engineers to any other entity. I also would ask the Corp to maintain Green River and its lock and dam systems in a proper manner.

Thank you,

Ann D. Wells
10018 Provo Rd.
Rochester, Ky 42273

8-4-01

To Corps of Egineers.
You should remove
Jane Ruhl and send her back
To where she came from, Or
She may end up tarred & feathered
and on a rail.
She has made a lot of
enimies here is this Section
on Ky. due to here ideas to
remaved our dams and locks on
The Barren and Green rivers.
She is messing with our
Drinking Water Supply. To my
way of thinking she is as dumb
as a box of Rocks.
If the Corps had been
doing thier Job our dams and
Locks on the Green & Barren rivers
they would'nt be in the shape they
are today.
Public relations between

The corps are very strained This could lead To very Serious problems arising from this idea.

Also the control of Levels in our lakes are deaserious to our drink water problems. Don't you realize the way our rain fall has dimished that lowering the dams levels To Far reduces our drinking water Sopply. Do you not look at the far reaching Weather reponts. For instance this year our water Sopply is in very Serious problems due to To much water being released. Thier is no flow of water out of Barren river dam to put movement on the river I have lived here since 1973 and this is the first year that only a Trickle of water is going

Over the rock dam here in Bowling Green that is our water Supply. that is because The corps is to lazy to do any thing. They are doing it The Easy way. Drop it down in the fall and closed it up in The spring. That way the corps don't have to work To hard

Mr. J. M. Sisk
1336 High St
Bowling Green Ky 42101
270-782-2725

JULY 20,2001

DEAR MS. RUHL:

I LIVE NEAR MORGANTOWN, KY. AND(AS ARE MANY OF THE CITIZENS HERE) I'M VERY CONCERNED ABOUT THE U.S. CORPS OF ENG. PLANNED CHANGES TO THE LOCKS AND DAMS ALONG THE GREEN AND BARREN RIVERS.

MANY PREFER THAT THE RIVERS BE CLEANED OUT AND THE LOCKS AND DAMS CONTINUE TO BE MAINTAINED BY THE CORPS OF ENG. IT IS CRITICAL THAT AS DEEP A POOL OF WATER(AS IS FEASIBLE BE MAINTAINED TO KEEP A CLEAN WATER SUPPLY TO THE MANY TOWNS AND COMMUNITIES THAT DEPEND ON THESE RIVERS. IF THE RIVER LEVEL IS LOWERED AND THE WATER UTILITY INTAKES WOULD HAVE TO BE LOWERED THIS WOULD ALLOW THE HEAVY METALS AND OTHER POLLUTANTS INTO THE DRINKING WATER. IT IS BECOMING MORE WIDELY KNOWN THAT BOTTOM FEEDING FISH CONTAIN MUCH HIGHER LEVELS OF LEAD, MERCURY, ETC. THEREFORE UNDER NO CIRCUMSTANCES CAN I UNDERSTAND HOW IT COULD BE OF BENEFIT TO ANYONE TO REMOVE ANY PART OF ANY OF THE LOCKS AND DAMS UNLESS THEY ARE REBUILT. THIS IS CRITICAL TO INDUSTRY, AGRICULTURE, THE UTILITIES, AND EVERY HOUSEHOLD AS WELL AS THE POSSIBILITY OF FUTURE RIVER TRAFFIC.

THANK YOU FOR CONSIDERING THIS VERY SERIOUS MATTER.

BENJAMIN, BLUNT
Benjamin Blunt
2945 ROCHESTER RD.
MORGANTOWN KY. 42261



RIVERVIEW FARMS
Larry & Beverly Graham
847 OLD RICHARDSVILLE RD.
BOWLING GREEN, KENTUCKY 42101
Phone ~~(502)~~ 270 842-3730



July 20 2001

Jane Ruhl
U.S. Army Corps of Engineers
P.O. Box 59
Louisville, Ky. 40201-0059

Dear Ms Ruhl,

This letter is intended to present constructive criticism and opposition to the plan to breach dam #1 on Barren River at Greencastle and offer a very simple low cost solution to the problem. Simply fill the lock chamber and allow the dam to stay "as is".

As background, I am 72 years old. My farm is bordered front and rear by Barren River below the Bowling Green Water intake. One boundary, nearest my residence, is about ½ mile upstream from the City Sewer Discharge and the rear boundary is about 2 miles downstream from that point. I have lived here all my life and have spent many days on the river. Before the Corps abandoned upkeep of the channel there was considerable barge and houseboat traffic on the rear boundary. (The "head of navigation" was at the Boatlanding which is just upstream and in sight of the sewer discharge). The Corps ceased channel maintenance in the late '50s or early '60s and the river reverted to its present state. There was a period during which Bowling Green discharged virtually raw sewage into the river and fish populations were virtually nil below the sewer plant. In all fairness, the current discharge seems to be relatively clean most of the time and fish have returned. I hope the above will clarify that I know whereof I speak.

Advantages of Corps Plan claimed by Corps

1. Protect endangered species in Mammoth Cave.
2. Cost saving - Economy-Maintenance.
3. Safety. Lock Chambers present hazards.
4. Create "canoe streams".

Rebuttal

1. I have no first hand knowledge of the Green River as it relates to Mammoth Cave, however, it would seem probable that any life form affected by the water levels caused by the Green River dams would have long either adapted or become extinct given the current water level which has existed for the past 100 years. Breaching the Dam at Greencastle on Barren River would have no effect on upper Green River, however it will result in major destruction of fresh water mussels and other aquatic life forms as the water level recedes. This occurred on a large scale when the dam at Woodbury failed. I personally observed literally acres of dead mussels in Green River shortly after the dam broke. I believe several mussel species in the upper Barren near Bowling Green are currently listed on either the "threatened species" or possibly "endangered" species list. Additionally, lowering the water level would destroy the habitat for a healthy balanced population

of several species of fish.

2. Essentially no maintenance is occurring or has occurred at Dam #1 on Barren for many years. A simple solution might be to simply fill the lock chamber with rock or quarry rubble and stabilize if needed with a mixture of cement and similar material near the surface. This would leave only the exterior lock wall which is no more hazardous than numerous bluffs naturally occurring along the river.

3. See #2 above.

4. I own a canoe and a fishing boat and use both occasionally on Barren River. At the present time, water depth is 12-18 inches within ½ mile upstream from Bowling Green Boatlanding. If the dam were breached this would revert to a gravel bar with minimal (if any) flow of water across it. That of course, would be only one of many gravel bars which would require portage of a canoe. I don't believe too many canoe enthusiasts would opt for hiking along carrying a canoe for extended distances. Breaching the dam would destroy many miles of canoe friendly river. It would create none.

Following are a few concerns which have not been publicized by the media.

1. Water quality. Bowling Green sewage effluent is discharged into Barren River. At present there is a reasonably deep reservoir at that point which allows the effluent to diffuse into the river with no apparent ill effect. That has not always been the case and there is no assurance that the sewer treatment plant will be able to maintain its current effectiveness when normal population growth overtakes capacity. Additionally, the construction of the proposed Tri Modal Industrial Park which currently is claiming the attention of the City Commission, Fiscal Court, and other parties will exacerbate the waste water problem. One doesn't need a "consultant" to realize that the (claimed) 7500 additional jobs will generate a vast amount of sewage and waste water, most of which will eventually end up in Barren River due to both surface and underground drainage. I do not look forward to having an open sewer running past two boundaries of my farm.

Incidentally, on July 17th I was on the river in my boat. There was no discernable current or flow of water between the sewage plant discharge and a gravel bar about 3/4 mile upstream where I encountered a gravel bar about 14" deep and had to turn back downstream. There was a little flow below the waste water discharge. Essentially, the section of river between the B.G. Water intake and the Sewer Discharge is virtually devoid of current as evidenced by algae and floating stationary "scum". In other words, at the current level (controlled by the corps at Barren River Lake), the City of Bowling Green apparently removes about as much water at their pumping station as they return to the river from the waste water plant several miles downstream. This fact was further confirmed to me by a State Water Quality employee who I encountered taking a water sample from the Old Richardsville Road Bridge on July 19th. Despite the fact that the area had received about 1 inch of rain the day before, he confirmed that there was some "flow" of water just below the intake plant, there was no discernable flow at the downstream station above the treatment plant and that the river at this point was essentially stagnant. (His word-not mine).

2. Unrestricted movement of domestic/wild animals. (and people) across gravel bars. Wandering cattle, coyotes etc will present a challenge to farm operations along the river if this historical

natural barrier is removed. We currently have our cattle fenced away from the river for a number of reasons, however that is not the practice of some farms across the river. It is one task to fence my cattle in, however it is much harder to fence other wandering cattle out. There is a large population of Coyotes across the river from my property on essentially abandoned farmland. At present the river discourages them from crossing. They will have unrestricted access to a food source when they can simply trot across a gravel bar to feed on our baby calves.

3. Historic levels as espoused by the Corps is a misnomer. The dam on Barren river is not the first dam at that location. There was a grist mill at that location in the 1800's. Much of the old stonework is still visible across the river from the present lock chamber. Although the current dam raised the water level to about 12 feet minimum, the old dam (which pre-existed the Corp of Engineers) created a sufficient pool to accommodate packet boats and "excursion" boats from that location to the Bowling Green Boatlanding and most of the freight coming to the city came by river to the Boatlanding. Thus, there is no validity to the claim that breaching the dam would return the river to its original condition. In order to do that, you would need to also breach the Barren River reservoir dam. We would then return to periodic floods but also have sufficient water flow in dry seasons to prevent many problems caused by the "controlled" flow now possible due to that dam.

4. Subsidence- Again, you do not need a consulting engineer to realize that when you remove 8-10 feet of water from depth, you also remove the pressure exerted upon the stream bank and thus cause large trees, farmland and adjacent soil and stone to simply fall into the void and "disappear" except for the debris which will, in many cases clog the river and impede the natural flow of water. This was very evident in the area of Green and lower Barren river below Dam 1 when the Dam at Woodbury washed out.

5. Property disputes- Most deed descriptions for land along the river describe property boundaries as "low water mark". What happens when there is no low water mark? How far does my property extend? Who controls the gravel bars? Who is liable for the various trespasser activities that could occur in this no mans land?

Finally, I am not an attorney, however I strongly feel that if the dam at Lock #1 on Barren River is breached, that action will constitute an "Illegal Taking" of private property by Government based upon many of the concerns outlined above and on others as well. The Corps of Engineers should not expect taxpayers to rely upon their promises or their credibility given the fact that they abrogated their responsibility when they refused to consider repair of the failed dam at Woodbury and , instead spent more taxpayer money conducting various "studies" which were all prejudiced to support their wish to abandon Barren and Green Rivers completely than would have been required to make effective repairs to maintain water levels. The over used term of "Cost Effective" comes to mind.

Please don't compound the problem by this ill conceived venture to destroy Barren River as we have known it for several generations.

Very Truly Yours

L.H. Graham

P O Box 519
Morgantown, KY 42261
July 31, 2001

Jane C. Ruhl, Dept of the Army,
U. S. Army Engineer Dist.
Louisville Corp of Engineers
P. O. Box 59
Louisville, KY 40201-0059

Dear Ms. Ruhl:

As residents of Morgantown and owners of a farm on Green River, we are opposed to the Corp of Engineers proposal to remove what is left of the locks and dams on Green River.

It is our opinion that the locks and dams should be repaired and maintained by the Corp of Engineers in order to assure an adequate water supply for Morgantown and Butler County.

Other counties along Green River have similar problems.

We appreciate any help you can give along this line.

Sincerely,

Troy L. Tuck

Wilma S. Tuck

Bluegrass Structures

491 Rich Pond Rd.
PO Box 20352
Bowling Green KY 42104
270.843.1719

AUG 6,01

JANE RUHL
U S ARMY CORPS OF ENGINEERS
LOUISVILLE,KY

SUBJECT, LOCK/DAMS ON GREEN AND BARREN RIVER(HANDS OFF) THE CORPS DONE SOME VERY GOOD THINGS,HOWEVER THEY HAVE A REPATION FOR SOME REAL SCREW UPS THIS IS NOT FOR THE CORPS TO MAKE THE FINIAL CALL,WE IN THE AREA MUST HAVE FINIAL SAY.

THANKS

FRED DOWELL

P.O. Box 840
Bowling Green, Kentucky, 42101
August 6, 2001

M/S Jane C. Ruhl
U. S. Corps of Engineers
P. O. Box 59
Louisville, Kentucky, 40201

TO WHOM,IT MAY CONCERN:

This letter to the Corps of Engineers is written with great concern as to what you are doing to the locks and dams on the Green and Barren Rivers that cannot be undone.

First you should heed to the cry of the people in our area. The future of our State and our Country are at risk, and the fact you are spending the hard earned money of our tax payers. You have made numerious studies with lots of tax dollars. Have you thought about human consumption of scarce water in our area. We have had drought conditions for several years and our water table is so low. What will happen when you finish blowing out the dams, and we get a small trickle of water down stream? What we have ends right down to the end of the Mississippi River below New Orleans.

I am a Fourth Generation of a river family that has made their living by river transportation. We have employed lots of people, moved many commodities by river, and transported avaition gasoline during World War II. We know what the river has done, and we haveloved every minute of it. It has kept young people in our valley, aided industry, irrigation for farmers, and watered our farm animals.

The river scenery is beautiful. There is canoeing, pleasure boats and fishing to be enjoyed. We gave the old boatlanding here in Bowling for such pleasures.

Hartford, Kentucky, has a little dam on Rough River to conserve its water supply. Various other little towns near by have their small streams and creeks dammed for the same purpose. Here in Bowling Green we have a few big rocks dumped in Barren River above the State Street Bridge by a local contractor to back us up a little water supply. Do you intend to remove these little dams also? We need a clean and ample water supply in our nationmand not the removable of our present dams.

How many of you making this study live in our area? Would this entice you to come our way? Would you want a small trickle of slimy, germy water for your childrens daily supply?

As I wrote the Daily News, fill the lock pitts with soil. Plant them with wild flowers and trees to bring back our endangered bees, butterflies, and birds. It is our utmost hope you will re-evaluate your survey and get us in the right direction to conserve our water supply.

Sincerely

James G. Hines

James G. Hines

July 26, 2001

Jane C. Ruhl
Department of the Army
U.S. Army Engineer's
Louisville Corp. of Engineers
P O Box 59
Louisville KY 40201-0059

Dear Ms. Ruhl:

I am a citizen of Butler County, where the Corp of Engineers is about to destroy our water supply. I think that in your position with the Corp of Engineers you would take pride in your job and help the people when they need it. We need the Green River and the Locks and Dams in order to have a water supply. If the Corp of Engineers fail to maintain the Green River, we the people of Butler County will suffer, our children will suffer, as well as other counties. While you and others will be sitting behind a desk not affective by your decision to not keep up the Green River and the Locks and Dams. We are pleading for your support, water supply for Butler County and other surrounding counties. The Corp of Engineers needs to think long and hard about their decision that will affect thousand's of families.

Sincerely,

Nyla H. Morgan

Nyla H. Morgan
Citizen of Morgantown, KY

August 3, 2001

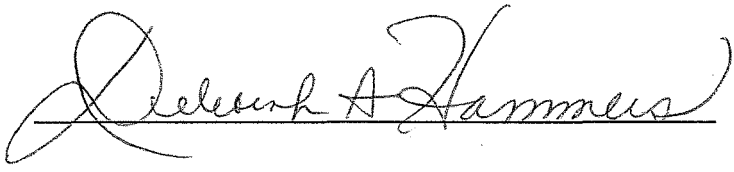
Jane C. Ruhl
Department of the Army
U.S. Army Engineer Dist., Louisville Corp of Engineers
P.O. Box 59
Louisville, KY 40201-0059

Dear Ms. Ruhl:

With regard to Green River Locks and Dam, number 3, 4, 5 and 6, located in Butler and Edmonson County and Barren River Lock and Dam No. 1 in Warren County, I believe the United States Army Corp of Engineers should remain in control and maintain or improve the present structures rather than remove or destroy them.

Sincerely,

Concerned Citizen



Ruhl, Jane C LRL02

From: Hotmail [frankh_ky@hotmail.com]
Sent: Tuesday, July 10, 2001 7:14 PM
Ruhl, Jane C
Subject: Proposal to remove Lock & Dams on Green

To Whom IT May Concern:

As a result of the decision to remove the locks on Green River, I would like to express my opinion. I am a resident of Edmonson County and live on Stockholm Road, commonly known as the Mammoth Cave Ferry Road. This area has for decades been called the Forks Of The Green River. If you check a map of Edmonson County and locate the junction of Hwy 1827 and Stockholm Road you will see that I live approximately 4 miles from the Mammoth Cave Ferry on the North side of the park.

I work in Oakland and take the Mammoth Cave Ferry daily. It is 25 miles one way driving through Mammoth Cave Park. When the ferry is closed, I must drive around the park through Brownsville. This adds an additional 20 miles to my trip. Also, my post office is in Mammoth Cave Park. Crossing the ferry, I can be there in 10 minutes, that is if the ferry is open. When the ferry closes I must drive around through Brownsville. This takes 45 minutes and I pass three other post offices! A trip to Cave City, Park City, Glasgow, Bowling Green, etc can take an additional 20-45 minutes if the ferry is closed.

This past summer the park superintendent closed the ferry for almost two months for low water. I visited the ferry during this period of closing to check on the water level. There was no valid reason for it being closed. I have seen the ferry run on numerous occasions when the water was much lower. The current park superintendent has closed park roads that have been open since the park was established. He has banned commercial traffic through the park. He has lowered speed limits to 35 mph and 45 mph when by law they can be no lower than 45 mph. I have even been told that he has privately stated that he intends on closing the Mammoth Cave and Houchens Ferry roads and THERE IS NOT ENOUGH MONEY IN EDMONSON COUNTY TO STOP HIM.

My point is that the citizens of Edmonson County can not trust the Park Service to protect our rights! They will do what they please, when they please because they are not elected officials. When Edmonson County turned over the rights of county roads Mammoth Cave Park, the courts required the park to keep the roads open, even if a bridge had to be built. Now they say it is to expensive!

If the water level stays to low it just gives the park superintendent an excuse to close the roads! And he will ignore the courts instructions that was given 60 years ago when Edmonson County tried to help the Park Service. No one outside of Edmonson County seems to care.

I have a handicapped son that occasionally needs ambulance service to the Medical Center in Bowling Green. Twenty minutes to the emergency room can make the difference in LIFE and DEATH! What if it were your son?

Frank Hayes
125 Stockholm Rd
Mammoth Cave, KY 42259
Phone (270)286-8229

08/09/2001

Ruhl, Jane C LRL02

From: CHRISTYAHUNT@aol.com
Sent: Tuesday, June 26, 2001 11:10 PM
Ruhl, Jane C
Subject: CHANGES TO THE GREEN

THINK THAT FILLING UP THE DAMS WILL LOWER THE WATER LEVEL OF THE RIVER SIGNIFICANTLY, AND THAT WILL NOT BE GOOD FOR THE RESIDENTS OF BUTLER AND SURROUNDING COUNTIES. IT MEANS THAT RESIDENTS WILL HAVE TO FIND ALTERNATE ROUTE OF TRAVEL, WITH THE THREAT OF CLOSING THE FERRY. MANY PEOPLE USE THE FERRY AS A MEANS OF TRAVELING TO AND FROM WORK, OR JUST TO GET AROUND WHEREEVER THEY MAY BE GOING.

A

CONCERNED RESIDENT,

MICHAEL S. HUNT

08/09/2001

Ruhl, Jane C LRL02

From: *bobbya [bskkalford@msn.com]*

Sent: Thursday, July 19, 2001 11:43

Ruhl, Jane C

Subject: Green River Locks and Dams

was at the Butler County meeting in June. Many people chose to stand and speak after listening to the Corps proposals, butI did not hear one person speak in favor of the Corps proposals. Was anyone listening then or is anyone listening now. People in this area want the Corps to do the neglected duty and take care of the locks and dams, not fill up the locks and sell off the property to some other entity. This is just not right. The people in this area feel cheated and let down by their government and by the Corps. But I suppose because these people are relatively small in numbers and do not have a tremendous amount of political influence, their desires will be overlooked and you will do what **you** want and intend to do.

realize that the meeting in Butler County was just a formality and that it was necessary. It kind of gave the people a way to say what they thought yet knowing all along the government agency would do as it willed. After all the government wants even people without power to believe we live in a "free" country still.

have no special interest in this one way or another. I represent no business or group other than myself and my family. I have a masters degree in geography and education from Western Kentucky University, and I am merely a social studies teacher who often tries to make his students believe that their government has their interests at heart. What a joke in a case like this.

Bobby Alford
240 Caneyville Road
Roundhill, KY 42275

Ruhl, Jane C LRL02

From: Burd, Alan (GEA, 089245)
Sent: Wednesday, June 27, 2001 8:24 AM
'jane.c.ruhl@lrl02.usace.army.mil'
Subject: URGENT

Jane, myself and a vast number of my friends (ages 33-45) completely and adamantly oppose the demolition of the locks on Green river. Green river is a valuable natural resource that is greatly appreciated frequently used by many of the local people. Besides canoeing and swimming other various items of recreation would be greatly effected if the locks were removed. There are many young people from the Louisville area that frequent the Mammoth Cave area solely for taking a canoe ride along the beautiful Green river. Reducing the flow of the river would endanger much more than the ferry traffic, but also many other valuable assets that the river brings forth. Please consider this in making the necessary decisions that will greatly affect this world renowned river either for the good or the bad.

GE Appliances
ALAN BURD
Technical Engineer (Co-op)
AP5-1N-105
Louisville Ky. 40225
Phone: (502) 452-3010
Pager: (502) 344-7538
ALAN.BURD@appl.ge.com

Ruhl, Jane C LRL02

From: drfinn2k1@aol.com[SMTP:drfinn2k1@aol.com]
Sent: Thursday, August 02, 2001 2:27 PM
To: jane.c.ruhl@lr02.usace.army.mil
Subject: Dams

I am typing in regards to the proposal to alter the lock and dam systems of Green and Barren Rivers. I am a resident of Bowling Green and an outdoor sportsman who frequents both the rivers on a regular bases. The rivers have been flowing under the current system long before you or I have been alive. During this time the ecosystem has grown and evolved around both rivers and has suited the public and wildlife well. I do not see any positives in blowing up dams, spending tax payers money and EXPERIMENTING with something that needs no adjustments! I enjoy the fact that i can put my boat in Green River and be in 40 ft of water for miles and if i want to go to sandbars and swift water i can just put my boat in on the other side of the dam. It's like having 2 different rivers 1 mile apart....you just can't beat that. Why destroy what nature has built around for so many years....why turn a stretch of river that is 40 feet deep into one that is 5 ft deep and essentially unusabl!
!
e by motor boat. What I am gett
ing at is I call this river home and so does my community! We don't want a change...you would not like it if i changed something in your community that you did not want and had no effect on me one way or another just because it seemed like a neat project to dump 3 million dollars on!
Please consider who it will effect the most and let them be the ones who thinks this is a good idea or not!
Thank you for your time! IF IT AIN'T BROKE THEN DON'T TRY TO FIX IT!
Danny Finn

Public Involvement - 2014

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

REPLY TO
ATTENTION OF:

CELRL-PM-P-F

February 13, 2014

TO WHOM IT MAY CONCERN:

Enclosed please find a copy of the draft feasibility report and draft Environmental Assessment (EA) for the Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1 Disposition Study. The purpose of this report is to evaluate the feasibility of, and make recommendations regarding the possible deauthorization and disposal of the existing navigation facilities. The facilities are located on the Green and Barren Rivers between Brownsville, Kentucky and Rochester, Kentucky on the Green River, and at Greencastle, Kentucky on the Barren River. These structures are no longer used for the authorized Federal purpose of commercial navigation. The facilities and the pools are no longer maintained by the Corps of Engineers; however, the Corps still has ownership of the properties and inspects the facilities periodically. A study was done in the early 1990's to determine if it would be feasible to restore navigation to the upper reaches of the Green River. This study found that there would be insufficient benefits from commercial navigation operations to support restoration of navigation. The Corps of Engineers currently maintains the properties in a caretaker status. There are two other navigation facilities on the Green River. Lock and Dam 1 near Spottsville, Kentucky and Lock and Dam 2 at Calhoun, Kentucky are still used for commercial navigation. This study does not include these two locks and dams.

Contingent upon a favorable finding regarding deauthorization of the facilities, the sites could then be disposed of using the provisions regarding surplus government property administered by the General Services Administration (GSA). Disposing of these facilities supports Presidential Memorandum dated June 10, 2010, entitled "Disposing of Unneeded Federal Real Estate". A Draft EA of the proposed action and possible alternatives has been prepared. This draft EA is being circulated for public review and comment as well as review by State and Federal resource agencies and stakeholders. Comments that are received will be considered in the decision to sign a Finding of No Significant Impact or to prepare an Environmental Impact Statement. The U.S. Fish and Wildlife Service's comments on this project are hereby requested in accordance with the Fish and Wildlife Coordination act of 1958.

Based on the available information, it has been determined that no threatened or endangered species, the critical habitat thereof, or any proposed species to be listed will be adversely affected by the proposed action. In accordance with the Endangered Species Act of 1973, as amended, should any species be identified in the area during implementation, then consultation with the U.S. Fish and Wildlife Service will be initiated by the proponent action or their assigned representative.

The project area was reviewed for prehistoric and historic cultural resources. The five locks and dams structures are eligible for inclusion in the National Register of Historic Places. Transfer from Federal ownership is considered an adverse effect. Further consultation with the KY-SHPO and other interested parties would be undertaken to determine appropriate mitigation measures for inclusion in a Memorandum of Agreement to address project effects. Development of a Memorandum of Agreement would be completed prior to implementation of the project. Should it become known that specific prehistoric or historic sites or historic structures will be affected by the proposed action; the Louisville District Corps of Engineers would perform the necessary investigations and/or data recovery activities pursuant to Public Law 89-665, the National Historic Preservation Act of 1966.

Any person with an interest with regard to this proposed project may provide comments. Comments received by 5:00 pm EDT on March 17, 2014 will become part of the record and be given due consideration in making a final decision with regard to this action.

Please address all comments or inquiries to the above address, ATTN: Mr. Nathan A. Moulder, CELRL-PM-P-F, e-mail at Nathan.A.Moulder@usace.army.mil, or telephone at (502) 315-6776.

Sharon M. Bond
Chief, Planning Branch
Louisville District

Mailing List

Green and Barren Disposition Study – Public Notice/EA Letter – February 11, 2014

Lee Andrews
U.S. Fish & Wildlife Service
330 W. Broadway
Room 265
Frankfort, KY 40601

Kentucky Department of Fish & Wildlife Resources
#1 Sportsman's lane
Frankfort, KY 40601

Kentucky Department of Parks
500 Mero Street
Frankfort, KY 40601

Mark Dennen
Acting Executive Director and State Historic Preservation Officer
Kentucky Heritage Council / State Historic Preservation Office
300 Washington Street
Frankfort, KY 40601

Kentucky State Clearinghouse
Office of the Governor
Department for Local Government
Attn: Ms Lee Nalley
1024 Capital Center Dr., Suite 340
Frankfort, KY 40601

Lincoln Trail Area Development District
177 Graham Avenue
Bowling Green, KY 42101

Green River Area Development District
300 GRADD Way
Owensboro, KY 42301

Pennyrile Area Development District
300 Hammond Dr
Hopkinsville, KY 42240

Kentucky Emergency Management Association
David Sunn, Interim Executive Vice-President
PO Box 235
Calhoun, KY 42327

Bowling Green Area Chamber of Commerce
710 College St.
Bowling Green, KY 42101

Morgantown-Butler Chamber of Commerce
112 South Main Street
PO Box 408
Morgantown, KY 42261

Ohio County Chamber of Commerce
1350 Clay Street
Hartford, KY 42347

Greater Muhlenberg Chamber of Commerce
214 North 1st Street
PO Box 671
Central City, KY 42230

Edmonson County Chamber of Commerce
121 Washington St
PO Box 336
Brownsville, KY 42210

N.E. Reed
Edmonson County Judge/Exec
PO Box 353
Brownsville, KY 42210

Rick Newman
Muhlenberg County Judge/Exec
P. O. Box 137
Greenville, KY 42345

David Johnston
Ohio County Judge/Exec
130 E Washington St Suite 209
Hartford, KY 42347

David Fields
Butler County Judge/Exec
P.O. Box 626
Morgantown, KY 42261

Mike Buchanon
Warren County Judge/Exec
429 East 10th Ave, Suite 201
Bowling Green, KY 42101

Warren County Public Library
1225 State Street
Bowling Green, KY 42101

Butler County Public Library
116 W. Ohio St
P.O. Box 247
Morgantown, KY 42261

Ohio County Public Library
413 Main St.
Hartford, KY 42347

Central City Public Library

108 East Broad St
Central City, KY

Edmonson County Public Library
280 Ferguson St
Brownsville, KY 42210

Ohio County Times News
314 Main Street
PO Box 226 Hartford, KY 42347

Daily News
813 College Street
PO Box 90012
Bowling Green, KY 42101

Leader-News
PO Box 471
Central City, KY 42330

KY Department for Environmental Protection
300 Fair Oaks Ln
Frankfort, KY 40601

Regional Administrator
US EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Senator Rand Paul
600 Dr. Martin Luther King Jr. Pl,
Rm 1072B
Louisville, KY 40202

Senator Mitch Mcconnell
601 W. Broadway
Room 630
Louisville, KY 40202

Governor Steve Beshear
700 Capitol Avenue, Suite 100
Frankfort, Kentucky 40601

KY Department for Natural Resources
2 Hudson Hollow
Frankfort, KY 40601

KY Division of Conservation
375 Versailles Road
Frankfort, KY 40601

Congressman Ed Whitfield
Hopkinsville Office
1403 S. Main Street
Hopkinsville, KY 42240

Congressman Brett Guthrie
Warren County Regional Office
1001 Center Street, Suite 300
Bowling Green, KY 42101

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE, 4TH FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

March 13, 2014

Department of the Army
U.S. Army Engineer District, Louisville
Attention: Nathan A. Moulder, CELRL-PM-P-F
P.O. Box 59
Louisville, Kentucky 40201-0059

Re: Kentucky 401 Water Quality Certification Comments
Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study
AI No: 120684; Activity ID: APE20140001
Green River Milepoint 108.5, Milepoint 149.0, Milepoint 168.1, and Milepoint 181.7 & Barren River Milepoint 15.0
Butler, Edmonson, Ohio, Muhlenberg & Warren Counties, Kentucky

Dear Mr. Moulder:

The Kentucky Division of Water, 401 Water Quality Certification Section has reviewed the draft Feasibility Report and draft Environmental Assessment for the Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study. We would like to provide the following comments as requested in the letter dated February 13, 2014:

1) Surveys conducted within the lock and dam sites and their associated pools have resulted in findings of several federally listed mussel species within the potential impact area of the project, including the following:

   - *Palaemonias ganteri* (Kentucky Cave shrimp) (Endangered)
   - *Lampsilis abrupta* (Pink Mucket) (Endangered)
   - *Obovaria retusa* (Ring Pink) (Endangered)
   - *Pleurobema plenum* (Rough Pigtoe) (Endangered)
   - *Plethobasus cyphyus* (Sheepnose) (Endangered)
   - *Cyprogenia stegaria* (Fanshell) (Endangered)
   - *Cumberlandia monodonta* (Spectaclecase) (Endangered)

2) According to 401 KAR 10:031, Section 8(1)(a), the following Green River and Barren Rivers segments have been designated as an Outstanding State Resource Water (OSRW), because of the presence of a federally listed species:

Waterbody Name	County	Boundary	Designations	Federally Listed Threatened or Endangered Species
Barren River	Warren, Butler	Lock and Dam #1 (River Mile 15.1) to Green River	Outstanding State Resource Water	*Cyprogenia stegaria, Pleurobema plenum*
Green River	Butler, Warren	River Mile 149.7 (1 Mile Below Lock and Dam #4) to Lock and Dam #5	Outstanding State Resource Water	*Pleurobema plenum, Plethobasus cyphyus*
Green River	Ohio, Butler	1 mile upstream and downstream of River Mile 108.5	Outstanding State Resource Water	*Lampsilis abrupta, Pleurobema plenum*

3) These designations may not be all inclusive. Other federally listed species may also inhabit the waters upstream and downstream of the aforementioned Locks and Dams. Therefore, it is possible that these segments are eligible for automatic OSRW inclusion due to the fact that these waters have the potential to support federally recognized endangered and/or threatened species of aquatic organisms pursuant to the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531-1544. As an example, Green River Lock and Dam 6 is located downstream from the boundaries of Mammoth Cave National Park, which is listed as an Outstanding State Resource Water from the western to the eastern boundaries of the park. Therefore, it is possible that federally listed species may occur within these segments, and surveys may need to be conducted.

4) Prior to beginning the removal of these facilities, a thorough examination of possible contamination of the accumulated sediments should be conducted for toxic metals, PCBs, etc. If contaminated sediments are detected that pose an ecological risk, removal of the sediments and disposing of the material to an approved upland/landward disposal site or approved landfill would be required.

5) Removal of the listed lock and dam structures should be completed in a controlled, gradual manner to prevent downstream flushing of large amounts of sediment laden waters. In addition, geomorphological studies should be conducted to determine the potential effects of head-cuts and destabilization of aquatic habitats. Operations and activities should also be conducted during low-flow conditions in the river.

6) The proposed alternative of fan fencing barricade installation and signage with presently unspecified parties to acquire property ownership and maintenance responsibility is not a viable alternative to the responsible disposition of these Federal properties.

7) Modification, stabilization and/or the removal of the structures would likely result in the highest water quality and habitat benefits by restoring segments of the rivers to pre-navigation conditions, and should therefore be the recommended alternative. The Division of Water

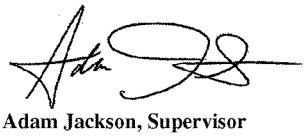
recognizes that there are risks associated with dam removal projects; however we believe the long term benefits of restoration will outweigh the risks.

8) Lewis Environmental Consulting, LLC of Murray, Kentucky was contracted by the U.S. Army Corps of Engineers' Louisville District to perform mussel surveys of the Green River in Pool 2 downstream of Dam #3, in Pool 3 between Dam #3 and Dam #4, and in Pool 4 between Dam #4 and Dam #5. The survey report concluded that "Overall, the long term benefits to the Green River in the event of the loss of Dam #3 would likely out-weigh any short term negative impacts to the established mussel populations in Pool 3 and downstream of Dam #3 in Pool 2. The return of Pool 3 to its natural condition and allowing the re-establishment of normal river flow patterns would recreate the conditions necessary for establishing normal ecosystems and communities within Pool 3 as they have been re-established in Pool 4 and in the lower Barren River."

9) We recognize that there are several significant issues that will need to be addressed before activities and operations proceed with this study, and we look forward to receiving more updated surveys, detailed plans and specifications regarding recommended alternatives and more site specific biological and environmental assessments for our review and comment. Pre-removal assessments of potential ecological impacts of dam removal and appropriate mitigation efforts should be included in the dam removal process to reduce short-term negative ecological effects of this restoration action.

Thank you for the opportunity to comment on the draft Feasibility Report and draft Environmental Assessment for the Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study. We would be happy to provide future pre-application guidance regarding dredge and fill permitting and authorization. If you have any questions regarding the comments provided, please contact Chloe Brantley of my staff, at Chloe.Brantley@ky.gov or (502) 564-3410 Extension 4863.

Sincerely,



Adam Jackson, Supervisor
Water Quality Certification Section
Kentucky Division of Water

AJ: CB

cc: Nathan A. Moulder, USACE: Louisville District (via email: Nathan.A.Moulder@usace.army.mil)
Leroy Koch, USFWS: Kentucky Ecological Services Field Office (via email: leroy_koch@fws.gov)
Joseph Zimmerman, KDFWR: Frankfort (via email: Joseph.Zimmerman@ky.gov)

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES

Steven L. Beshear
Governor

#1 Sportsman's Lane
Frankfort, Kentucky 40601
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fw.ky.gov

Bob Stewart
Secretary

March 21, 2014

U.S. Army Corps of Engineers
Louisville District
Attn: Nathan A. Moulder, CELRL-OP-S
P.O. Box 59
Louisville, KY 40201-0059

RE: Environmental Review for the Green River Locks and Dams 3,4,5,6 and Barren River Lock and Dam 1 Draft Feasibility Report and Draft Environmental Assessment, Kentucky

Dear Mr. Moulder:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has reviewed the draft feasibility study and draft Environmental Assessment for the Green River Locks and Dams 3,4,5,6 and Barren River Lock and Dam 1 Disposition Study. The projects are located on the Green River and Barren River in central Kentucky and are no longer federally purposed for commercial navigation. The structural integrity of the projects varies from relatively stable to poor condition. The structures at Green River Locks and Dams 3 and 5 and Barren River Lock and Dam 1 are in relatively good condition with straight alignments, few cracks, no settlement, and lack of seepage. Green River Lock and Dam 4 failed and was naturally breached in 1965. The structure at Green River Lock and Dam 6 is in poor condition showing signs of seepage around the lock wall, dam wall interfaces, weir cracks, and various sink holes.

Several alternatives were identified and evaluated for each of the projects. All structures were recommended to be deauthorized since they no longer serve the authorized purpose. The alternatives considered include no action (Alternative 1), federal disposal without altering the structures (Alternative 2), demolish the dam and fill the lock (Alternative 3), and modify the lock only (Alternative 4). Due to the relatively good condition of the structures and future need for water supply, Alternative 2 was selected for Green River Locks and Dams 3,4,5, and Barren River Lock and Dam 1. Due to the poor condition of the structure, resource benefits, and recreational benefits, Alternative 3 was selected for Green River Lock and Dam 6, which also includes modifications to Green River Ferry and Houchin Ferry. The repairs and modifications to the structures would be completed to allow for deauthorization. All construction work would be completely federally funded. If property disposal is unsuccessful, then the modified structures would continue to be in caretaker status.

KDFWR agrees with the alternative selected for Green River Lock and Dam 6, which includes the federally funded demolition of the structure and modification of the ferries within the existing pool. This would increase river connectivity and restore natural variability in flows throughout the pool. Aquatic habitats would be diversified by restoring various facet slopes to the Green River. KDFWR recommends evaluating the effects of Asian carp movement with the proposed alternative. The spread of the invasive species could jeopardize the recreational aspects and biodiversity of the Green River.

KDFWR recommends including additional information on the methods to be utilized for the alternative selected for Green River Lock and Dam 6 and the associated effects on the aquatic resources within Green River. This information includes, but is not limited to, plans for the accumulated sediment upstream of the dam, sediment contamination studies, demolition methods, physical channel effects from the pool elevation changes, and construction season.

KDFWR has management responsibility for the fisheries and mussel resources within the proposed project areas. The areas located directly beneath the projects are popular fishing destinations due to the turbulent flow and increase in oxygen levels. This makes these areas very popular fishing destinations. In contrast, the aquatic resources within the pooled portions of the referenced projects are less diverse and robust than the free flowing sections of river. Therefore, KDFWR would be in support of Alternative 3 for the remaining projects listed within the draft feasibility study due to the overall aquatic resource and recreational benefits. This alternative would reconnect the fragmented river system and increase aquatic habitat diversity throughout. However, we understand the full suite of issues that must be considered with dam removal. Adequate public water supply, private irrigation, and costs were the main concerns for not selecting Alternative 3. To alleviate public safety concerns and maintain the existing pools, Alternative 2 was selected for the Green River Locks and Dams 3, 4, 5 and Barren River Lock and Dam 1. This alternative also includes the federal disposition of the projects. Based on the report, several communities have shown interest in taking ownership of the projects. KDFWR has several concerns with the uncertainties in ownership of locks and dams on the Green River. Without knowing an entity's purpose for obtaining an existing structure and their future plans for the structure, KDFWR cannot support Alternative 2. Clarification on how an entity intends to manage a structure would allow KDFWR to make an informed decision whether the action would benefit or hinder the aquatic and recreation resources. In addition, it is unlikely that any entity would have adequate funding to repair, maintain, or demolish a structure. Therefore, KDFWR recommends identifying additional alternatives for the remaining structures that include a more definite owner and the planned use for the structures and the associated pool. If other alternatives cannot be identified and Alternative 3 is not feasible, then KDFWR supports Alternative 1, which includes no alterations to the structures and federal ownership would be maintained at Green River Locks and Dams 3, 4, 5 and Barren River Lock and Dam 1.

KDFWR recommends evaluating the effects of Asian carp movement with all of the proposed alternatives. Asian carp have been found throughout the Green River system including Green River Lake tailwaters. Regarding the proposed project areas, Asian carp are most prevalent in Green River Pool 3. Asian carp have been collected in Green River Pool 4, but in fewer numbers as compared to lower pools. However, it is assumed that the fish persist throughout the entire system due to a recent Green River Lake tailwater record. Sporadic occurrences have been noted in Green River Pool 4. KDFWR recommends evaluating the effects of a defragmented river, reduced pool elevation, and restoration of natural flows on the Asian carp and potential spread of the invasive species.

The disposition feasibility study list one boat ramp for Green River Pool 3, three boat ramps for Green River Pool 4, three boat ramps for Green River Pool 5, and one boat ramp for Barren River Pool 1. KDFWR has records of several other boat ramps located within the proposed project area. KDFWR recommends including these additional boat ramps and any potential effects in the disposition study. Below is a list of all boat ramps located within the proposed project area.

Green River Pool 3
Rochester Dam, Mud River Ramp, Reeds Ferry, HighView Hill Ramp, Cromwell Ramp, Morgantown Ramp

Green River Pool 4
Woodbury Ramp, Riverside Ramp, Greencastle Ramp (Barren), Honakers Ferry Ramp

Green River Pool 5
Bear Creek Ramp, Lock Dam #5 Ramp, Alexander Creek Ramp, Brownsville City Park Ramp

Green River Pool 6
Houchins Ferry, Nolin River Lake Tailwater, Mammoth Cave Ferry, Munfordville Stovall Park, HH Wilson Park Ramp

Barren River Pool 1
Lonnie White Boat Ramp, Boat Landing Road Ramp, Beachbend Campground Ramp, Potter Combs Ramp, Claypool Ramp

KDFWR appreciates the opportunity to review and comment on the draft feasibility study and draft Environmental Assessment for the Green River Locks and Dams 3,4,5,6 and Barren River Lock and Dam 1 Disposition Study. If you have any questions or require additional information, please call me at (502) 564-7109 Extension 4473.

Sincerely,

Joseph Zimmerman, Environmental Biologist

Cc: Environmental Section File

STEVEN L. BESHEAR
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL

BOB STEWART
SECRETARY

THE STATE HISTORIC PRESERVATION OFFICE
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CRAIG A. POTTS
EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

March 26, 2014

U.S. Army Corps of Engineers, Louisville District
ATTN: Jan Marie Hemberger
PO Box 59
Louisville, KY 40201-0059

Re: Green and Barren River locks and dams disposition study

Dear Ms. Hemberger,

Our office has recently received the above referenced report and supporting documentation. The Corps is considering the feasibility of disposing of a number of lock and dam facilities. Preferred alternatives reflected in the study include a range of activities, from minor work on a number of facilities before removing them from federal ownership to demolition of Green River Lock and Dam 6.

In general, we continue to concur with the original findings presented in this report as they relate to eligiblity for listing in the National Register of Historic Places. We continue to agree that work proposed (including removing the facilities from federal ownership), will result in an adverse effect to historic properties. In accordance with 36 CFR Part 800, we also agree that consultation on a Memorandum of Agreement or Programmatic Agreement is the appropriate course of action to resolve adverse effects and ensure compliance with the National Historic Preservation Act.

Based on our review of the current study and recent discussions with your office, we recommend these additional items to consider as consultation moves forward:

When originally assessed for National Register eligibility, only the locks and dams were found eligible. In more than a decade since the original Corps studies were done, consultation on similar facilities on the Green River initiated by FERC and its license applicants have found on-shore buildings like extant lock tenders' houses to be contributing structures in a functionally related complex. Therefore, it would be advisable to update information on any extant buildings and structures at the locks and dams included in this Corps undertaking. Our office is willing to work with the Corps and consulting parties to assess the current condition and potential National Register eligibility of these resources at such time as the Memorandum of Agreement is being developed for the undertaking. We do not anticipate a need for further formal studies, but current photo documentation of the resources would be required.

Work proposed for Lock and Dam 6 likewise needs additional discussion, as the broadest range of possible effects may not have been considered in earlier studies. Specifically, nothing substantial is known about the existence of archaeological sites pre-pool, and we have concerns that sites may become exposed when water levels drop and the river returns to natural levels. We also have concerns that effects from dropping water levels in Mammoth Cave have not been thoroughly discussed. To address these issues, we recommend development of an inadvertent discovery plan outlining appropriate level of effort and measures for identifying and treating such sites after the undertaking has taken place. This would be written and incorporated into the Memorandum of Agreement. Because of his specific expertise on this area's resources, we recommend Dr. George Crothers, Director of the Office of State Archaeology, as a consulting party to participate in the Section 106 process moving forward. Other appropriate consulting parties may be identified when consultation resumes.

Finally, we would want consultation during development of the Memorandum of Agreement to include discussion about deed restrictions and/or other provisions to preserve the integrity of any historic properties which transfer out of federal ownership. If disposition of the properties is referred to GSA for sale with deed restrictions, we would still expect additional consultation with our office to ensure proper compliance with Section 106. It would be our position that if these properties are transferred or moved out of federal ownership, a Memorandum of Agreement would be needed regardless of the manner in which this happens.

The Louisville District Office has proposed Section 106 consultation and development of a Memorandum of Agreement be renewed after the approval of the Green and Barren Disposition Study and, if received, the appropriate authorization from Congress to deauthorize the lock and dam facilities. It is our understanding timing for the consultation would also be dependent on funding to undertake Section 106 consultation, design work for proposed activities, and/or disposal of the properties. The Section 106 consultation and execution of the agreement document would be completed prior to the commencement of any construction or demolition activities. As part of the Section 106 consultation process the Corps would notify the ACHP of the undertaking and any work which affects National Register eligible properties. We have no opposition to this approach. However, we strongly encourage the Corps to plan for an adequate period of time to complete the Section 106 process, allowing for meaningful consultation with our office and other consulting parties in development of the Memorandum of Agreement.

Thank you for the opportunity to comment. We look forward to working with you further. If you have any questions regarding these comments, please contact Jill Howe or Kary Stackelbeck of my staff at 502-564-7005, ext. 121 or 115, respectively.

Sincerely,

Craig A. Potts
Executive Director and
State Historic Preservation Officer

Cc: George Crothers
CP:jh

United States Department of the Interior

NATIONAL PARK SERVICE
Mammoth Cave National Park
P.O. Box 7
Mammoth Cave, Kentucky 42259-0007

IN REPLY REFER TO:

L7617

March 21, 2014

Colonel Luke T. Leonard
Commanding Officer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Colonel Leonard:

Mammoth Cave National Park staff has reviewed the US Army Corps of Engineers (USACE) draft "Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study, Kentucky and Environmental Assessment". The following comments are limited to the Lock and Dam No. 6 (LD6) and Lock and Dam No. 5 (LD5) sections of the study because the proposed action will directly affect Mammoth Cave National Park natural, cultural, and recreational resources as well as the daily operation of the park.

The National Park Service (NPS) continues to support the removal of LD6 as it has since 1951 when LD6 was decommissioned by the USACE. Mammoth Cave National Park (52,830 acres) is the primary land manager affected by decisions related to LD6 with more than 90 percent of the LD6 impoundment located within the park.

Mammoth Cave National Park was established in 1941 to protect the cave and surface resources of the area. It was designated by the United Nations Educational Scientific and Cultural Organization as a World Heritage Site in 1981. In 1990, the park became the core area of an International Biosphere Reserve which extends into Barren, Butler, Edmonson, Hart, Metcalfe, and Warren counties in Kentucky. The Green River is designated as a Kentucky Wild River and Outstanding Resource Water.

The continued presence of LD6 is the single greatest unresolved ecosystem management issue at Mammoth Cave National Park. The current situation has tremendous direct adverse effects on resources and resource values within the park as defined in the NPS Organic Act of 1916 (16 USC 1); the NPS General Authorities Act of 1970, including amendments in 1978 (16 USC 1a-

1); and the 2006 NPS Management Policies available at www.nps.gov/policy/mp/policies.pdf (Section 1.4).

Overall, elimination of the LD6 impoundment would benefit park resources:

Ecological benefits
The suitable habitat would be increased for a number of federally threatened and endangered species, particularly mussels and a large number of state list species.

Mammoth Cave National Park contains an internationally important, if not unique, ecosystem that is impaired by the LD6 impoundment which extends underground into Mammoth Cave itself, altering habitat, producing sedimentation, and impairing geological processes. Elimination of the impoundment would provide for restoration of the ecosystem and improve its long-term sustainability. Removal of the impoundment would also result in benefits for research and understanding of the longest and most renowned cave system in the world.

The USACE study and environmental assessment states the removal of LD6 will add an additional 17 miles of natural, free-flowing stream to the Green River and seven miles to the Nolin River, when the impoundment is reduced. Park staff have noted a discrepancy on this point with the USACE study; it appears the removal of LD6 will add approximately six to eight miles of free-flowing river, because the LD5 impoundment extends upriver into the park to mile marker 192 on the Green River (approximately Boardcut Island), and up Nolin to near the tailwaters of the Nolin Dam. Although this zone of the Green and Nolin rivers will be lowered from a pool elevation of 421 to 412 feet, it should not be considered free-flowing because of the impoundment of LD5.

In order to fully restore 24 miles of free-flowing sections of the Green and Nolin rivers, the NPS strongly encourages the USACE to consider modifications to LD5 to reduce its impoundment area to approximately mile marker 182 on the Green River. The NPS requests USACE have discussions with the Edmonson County Water District concerning needed modifications to their water intake system if the LD5 modifications are implemented.

Recreational benefits
The NPS believes recreational opportunities will increase on both the Nolin and Green rivers with the removal of LD6 and the modification of LD5. In the last decade, the free-flowing section of the Green River inside the park (above the LD6 impoundment) has experienced a large increase in canoe and kayak use. The limiting factor for expanded use of the Green and Nolin rivers for additional recreational opportunities is the impoundment of LD6. If LD6 is removed and LD5 modified to reduce the extent of the impoundment area, an additional 24 miles of river would be available for recreational use by the public.

The NPS Rivers, Trails and Conservation Assistance Program is currently working with the Barren River Area Development District as the lead partner on a Blueway Water Trail planning process for the Green River. The proposed Green River Blueway Water Trail is envisioned to include more than 300 miles of the river corridor, from the dam in Taylor County to the Ohio

River. The water trail planning process will include a wide array of Federal, State and local stakeholders. There are sixteen counties and ten cities along the river that will be included in the water trail planning. The Blueway process will plan for portages around any standing dams. However, the removal of LD6 will greatly enhance the paddling opportunities by providing a more appealing and safer boating experience on the river.

The NPS requests and recommends further investigation and consultation regarding the following issues:

The continued operation of the Green River Ferry is essential for park visitors, operations, and emergency services. The Green River Ferry is also an important transportation corridor for local communities. Since the original USACE dam disposition study in 2004, Mammoth Cave National Park has completed an environmental assessment that specifically addresses continued operation of the Green River Ferry during periods of low river levels. Specific park plans for improvements at the Green River Ferry can be found at www.nps.gov/maca/parkmgmt/upload/GreenRiverCrossing_FONSI_Final_11-23-2011.pdf. Improvement plans to the Green River Ferry location, tentatively proposed for fiscal year 2018, remain subject to funding authorization. It is essential that improvements to the Green River Ferry location be completed before the removal of LD6 to insure continuity of ferry operation and essential services in the park. The NPS recommends that any dredging activity proposed by the USACE at the Green River Ferry be removed from consideration due to the adverse effects on threatened and endangered mussel species. The NPS also requests further discussion and consultation with the USACE regarding the Green River Ferry and proposed alterations at the Houchin Ferry to serve the interests of the park, park visitors, and local communities. The NPS strongly supports the conclusions and recommendations of the June 1999, US Fish and Wildlife Service's "Coordination Act Report for the Green and Barren Rivers Disposition Study" found in Appendix G of the USACE study. The NPS requests further consultation with the USACE and the US Fish and Wildlife Service (USFWS) prior to the implementation of any actions associated with this proposed project.

The NPS requests the USACE preparation of a Biological Assessment regarding the threatened and endangered Kentucky cave shrimp (*Palaemonias ganteri*) endemic to the Mammoth Cave region. The Kentucky cave shrimp has not been assessed in more than 30 years and the NPS requests additional study to minimize impacts to the species from the proposed project.

The NPS strongly supports the USACE preparing a Biological Assessment in consultation with the USFWS regarding potential impacts to threatened and endangered mussels, applying measures to minimize impacts to these species. We also support the proposed mussel investigation in the proposed project area in consultation with the USFWS.

The NPS strongly recommends the USACE develop a Memorandum of Agreement with the Kentucky State Historic Preservation Officer (SHPO). The NPS requests the USACE have further consultation with the Kentucky SHPO concerning potential exposure of historic structures and/or objects in the existing impoundment area of LD6 within the park. There are multiple historic ferry landing sites and other infrastructure that have not been evaluated because they are submerged in the impoundment of LD6. There is also the potential to expose historic

infrastructure and cultural artifacts that have been submerged inside park cave passageways for more than 100 years; they will need to be evaluated after the impoundment has been mitigated.

The USACE maintains a Green River gaging station at LD6, providing stage, discharge, temperature, and precipitation data. Future use and operation of the gaging station are not addressed in the USACE study. Stage, discharge, and water temperature information will be critical for restoration of the Green and Nolin rivers as they return to their natural, free-flowing conditions. The NPS proposes consultation with the USACE and the USGS to discuss operation or relocation of the existing LD6 Green River gaging station.

The NPS provides the following updated information regarding the status of park resources:

On July 26, 2013, the USFWS designated a 95-mile section of the Green River in Edmonson, Hart, and Green counties of Kentucky as critical habitat for the threatened and endangered Diamond Darter (*Crystallaria cincotta*). The lower extent of the Diamond Darter critical habitat on the Green River is located at the upper reach of the impoundment of LD6.

In Appendix D pages 21-22 Section 3.6 Air Quality section the USACE notes limited air quality information for the project area. Mammoth Cave National Park is designated a Class I area under the Clean Air Act, as amended in 1977, and 1990, and is the only Class I area in the Commonwealth of Kentucky. The Class I status provides the park with the most stringent protection from air quality impairment. The park has an extensive air quality monitoring program measuring: hourly concentrations of ozone; sulfur dioxide; carbon monoxide; nitric oxide; and total oxides of nitrogen; one in three day speciated fine particulate matter less than 2.5 microns measurements; one in three day coarse particulate matter less than 10 microns measurements; weekly composite mercury concentration and deposition measurements; weekly speciated composite acid concentration and deposition measurements; weekly speciated composite dry fine particle deposition measurements; 15-minute visibility measurements by particle scattering coefficient and 15-minute near-real time high resolution images of the Green River and Green River valley; and hourly meteorology. Data collected from the park air quality station undergoes extensive quality assurance and quality control procedures including routine performance audits by the Commonwealth of Kentucky and the US Environmental Protection Agency.

Bald eagles are present in the park, contrary to statements in Appendix E: Environmental Baseline Survey, page G6-13, "Wintering populations of federally threatened bald eagles (*Haliaeetus leucocephalus*) have been observed, and nesting pairs have been confirmed in areas to the west. Such nesting pairs will probably inhabit the project area in the future as the species continues to expand its range". The park has been monitoring a nesting pair of bald eagles at a location between the project area and Green River Ferry for the past three years.

In Appendix D page 49 the USACE report states, "Latent seed banks would be exposed as the water level drops after dam removal. Native plants, including sycamore, cottonwood, water maple, box elder, and willow trees, would soon begin to grow on the newly exposed riverbanks, likely increasing wetland habitat." The NPS notes there is a high potential for invasive species to initially propagate the exposed stream banks following the removal of LD6.

In Appendix D page 9 the USACE states "Several canoe liveries operate in this area, as well as a concessionaire tour boat operator." The Miss Green River II concessionaire tour boat operation discontinued service in approximately 2007. The tour boat has been removed from the river and the dock infrastructure has been removed from the landscape. The NPS does not plan to resume the tour boat concession operation in the park.

The NPS requests discussion with the USACE regarding the potential of transfer of property:

The NPS is interested in obtaining Parcel A consisting of 18 acres on the lock side of LD6. The NPS requests further discussions with the USACE concerning the property and associated infrastructure, including the adjoining lock chamber. The NPS also recommends the USACE demolish the lock chamber prior to the transfer of Parcel A to the NPS.

The NPS is interested in obtaining Parcel B consisting of 0.83 acres on the left bank of the Green River, along with its right of egress to the NPS. Portions of Parcel B and C consisting of 6.22 acres were previously transferred to the NPS on September 2, 1988. In addition, during the demolition of LD6, the NPS requests the USACE consider the removal of the abutment and associated infrastructure on the left bank of the Green River adjacent to the 0.83 acre tract. The NPS noted in Appendix E page G6-9 the existence of a two-inch diameter pipe resembling a fill pipe discovered on the 0.83 acre tract during a field investigation. The NPS requests mitigation of the pipe and potential underground storage tank during demolition of LD6. Further consultation with the USACE is requested prior to any proposed transfer of property for discussion of existing infrastructure associated with the property and right of egress.

If you have questions concerning these comments, please contact Bobby Carson, Chief, Science and Resources Management Division, at 270-758-2136 or by email at bob_carson@nps.gov.

Sincerely,

Sarah Craighead

Sarah Craighead
Superintendent

City of Brownsville
P. O. Box 238
Brownsville, KY 42210-0238

March 17, 2014

Nathan A. Moulder, CELLRL-PM-P-F
United State Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Mr. Moulder:

I am writing in regard to Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. As Mayor of Brownsville, the plan for the Green River Locks and Dams 5 and 6 is of concern to me.

In regard to Green River Lock and Dam 5, I commend the Corps on the recommendation of Alternative 2 to dispose without altering structures. As noted in the report, Lock and Dam 5 creates the pool of water on which Edmonson County Water District's intakes are located. These intakes supply water to Edmonson County and several surrounding counties and are very important for that reason. As you noted in the report, removal of this dam could create a number of issues with those water intakes. The City of Brownsville purchases their water from the Edmonson County Water District.

Regarding Green River Lock and Dam 6, you have recommended Alternative 3, which is removal of the dam, filling the lock, and stabilizing it. However, I do not personally support this alternative and would urge you to look into Alternative No. 4.

The largest concern of the local community is ferry service within the national park. Your report also notes that if your recommended plan were accepted, an additional $771,884.00 would have to be expended to keep Houchins ferry operational and an additional $211,995.00 would have to be expended to keep Green River ferry operational. Having personally been an Emergency Medical Technician with the local ambulance service, previously in my life, and helped provide medical services to residents of this area, many people would have longer commutes to the closest hospital without ferry service. These ferries are extremely important for transportation in northern Edmonson County.

Too, when Mammoth Cave National Park was established, transportation through those routes was guaranteed to Edmonson County and its citizens. I understand that the National Park service supports the efforts to remove this Dam due to the effects on the biodiversity of the river, however, the effect on the

City of Brownsville
P. O. Box 238
Brownsville, KY 42210-0238

citizens of Northern Edmonson County from a transportation perspective should strongly be taken in account. Locals also worry about sediment currently trapped by the lock and dam being released under your recommended alternative. The fear is this could cause problems with the water intakes in Edmonson County.

I appreciate your time and attention to this matter and would first and foremost ask that you consider leaving both Locks and Dams 5 and 6. I would also encourage you to make the needed modification at Lock 6 to stabilize the facility. Thank you for your understanding and assistance.

Sincerely,

Jerry L. Meredith
Mayor of Brownsville, Kentucky

Edmonson County Tourism Commission
P.O. Box 628
Brownsville, KY 42210

March 17, 2014

Nathan A. Moulder, CELLRL-PM-P-F
United State Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Mr. Moulder:

I am writing in regard to Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. Being Tourism Director for Edmonson County, the plan for Green River Locks and Dams 5 and 6 is of concern to me.

In regard to Green River Lock and Dam 5, I commend the Corps on the recommendation of Alternative 2 to dispose without altering structures. As noted in the report, Lock and Dam 5 creates the pool of water on which Edmonson County Water District's intakes are located. These intakes supply water to Edmonson County and several surrounding counties and are very important for that reason. As you noted in the report, removal of this dam could create a number of issues with those water intakes..

Regarding Green River Lock and Dam 6, you have recommended Alternative 3, which is removal of the dam, filling the lock, and stabilizing it. However, I do not personally support this alternative and would urge you to look into Alternative No. 4. The largest concern of the local community is ferry service within the national park. Your report also notes that if your recommended plan were accepted, an additional $771,884.00 would have to be expended to keep Houchins ferry operational and an additional $211,995.00 would have to be expended to keep Green River ferry operational. These ferries are extremely important for transportation in northern Edmonson County.

While there is the hope that the removal of the locks could bring more different types of water recreation to the area the loss of the ferries could also mean the risk of losing tourist that use the ferry to travel from Mammoth Cave National Park to Nolin Lake State Park. How unique the ferries are is also a tourists point of interests too.

Too, when Mammoth Cave National Park was established, transportation through those routes was guaranteed to Edmonson County and its citizens. I understand that the National Park service supports the efforts to remove this Dam due to the effects on the biodiversity of the river, however, the effect on the citizens of Northern Edmonson County from a transportation perspective should strongly be taken in account. Locals also worry about sediment currently trapped by the lock and
dam being released under your recommended alternative. The fear is this could cause problems with the water intakes in Edmonson County.

I appreciate your time and attention to this matter and would first and foremost ask that you consider leaving both Locks and Dams 5 and 6. I would also encourage you to make the needed modification at Lock 6 to stabilize the facility. Thank you for your understanding and assistance.

Sincerely,

Rhonda Clemmons

Rhonda Clemmons
Tourism Director for Edmonson County

DAVID FIELDS
BUTLER COUNTY JUDGE EXECUTIVE
P.O. BOX 626
MORGANTOWN, KY 42261
(270) 526-3433



March 21, 2014

Nathan Moulder
Project Manager
US Army Corp of Engineers
PO Box 59
Louisville, KY 40201-0059

Dear Nathan:

I am writing in support of the letter from the Rochester Dam Regional Water Commission, dated March 13, 2014. This Commission is made up of members from our region and from different entities.

In the past the RDRWC has met with the Army Corp of Engineers on the Rochester Dam Project and presented their concerns as well as their recommendations.

We fully support the efforts of this commission and its goals.

Sincerely,

David Fields
Judge Executive

Commonwealth of Kentucky

HOUSE OF REPRESENTATIVES

Michael Lee Meredith
P.O. Box 292
Brownsville, KY 42210
270-597-6049
State Message Line:
800-372-7181

State Capitol
Room 413, Capitol Annex
Frankfort, Kentucky 40601
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Fax: (502) 564-5538
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19th Legislative District

March 17, 2014

Nathan A. Moulder, CELLRL-PM-P-F
United State Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Mr. Moulder:

I am writing in regard to Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1. As State Representative of Edmonson County, the plan for Green River Locks and Dams 5 and 6 is particularly of interest.

In regard to Green River Lock and Dam 5, I commend the Corps on the recommendation of Alternative 2 to dispose without altering structures. As noted in the report, Lock and Dam 5 creates the pool of water on which Edmonson County Water District's intakes are located. These intakes supply water to Edmonson County and several surrounding counties and are very important for that reason. As you noted in the report, removal of this dam could create a number of issues with those water intakes.

Regarding Green River Lock and Dam 6, you have recommended Alternative 3, which is removal of the dam, filling the lock, and stabilizing it. However, I do not personally support this alternative and would urge you to look into Alternative No. 4. As noted in your report, the Dam has some stability issues and according to your cost estimates on construction to stabilize the Dam under Alternative 4, it would cost $3,308,300; whereas demolition of the dam under Alternative 3 would be $7,921,810.00.

The largest concern of the local community is ferry service within the national park. Your report also notes that if your recommended plan were accepted, an additional $771,884.00 would have to be expended to keep Houchins ferry operational and an additional $211,995.00 would have to be expended to keep Green River ferry operational. These ferries are extremely important for transportation in northern Edmonson County. Also, when Mammoth Cave National Park was established, transportation through those routes was guaranteed to Edmonson County and its citizens. I understand that the National Park Service supports the efforts to remove this Dam due to the effects on the biodiversity of the river, however, the effect on the citizens of Northern Edmonson County from a transportation perspective should strongly be taken in account. Locals also worry about sediment currently trapped by the lock and

dam being released under your recommended alternative. The fear is this could cause problems with the water intakes in Edmonson County.

I appreciate your time and attention to this matter and would first and foremost ask that you consider leaving both Locks and Dams 5 and 6. I would also encourage you to make the needed modification at Lock 6 to stabilize the facility. Thank you for your understanding and assistance.

Sincerely,

Michael Lee Meredith
State Representative

MLM:bjs



March 17, 2014

Mr. Nathan A. Moulder, CELRL-PM-P-F
Louisville District, US Army Corps of Engineers
Via email Nathan.A.Moulder@usace.army.mil

Dear Mr. Moulder:

Thank you for the opportunity to submit comments on the Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study, Kentucky, dated February 2014. (http://www.lrl.usace.army.mil/Portals/64/docs/CWProjects/Green%20and%20Barren%20dispo/Main%20Report.pdf). American Rivers is pleased to submit the following comments on this document:

1. American Rivers supports the disposition of obsolete infrastructure, and congratulates the Louisville District on undertaking this study.

2. The Louisville District recognizes and has promoted to local water purveyors that the District is under no obligation to maintain the dams to provide water supply, since it was never an authorized purpose for the dams. However, the District has not provided sufficient review of "river-friendly" water intakes in the evaluation of alternatives. Consideration of such water supply options could aid in the overall acceptability of the District's study to local water purveyors.

3. The Alternatives evaluated in this study do not sufficiently consider the need for Aquatic Organism Passage and canoe/kayak access at dams that will be disposed but not physically removed. Iconic resident riverine and ESA species would measurably benefit from habitat connectivity, a critical ecological need that is not addressed in the study. In addition, safety considerations evaluated in the study do not consider portage for paddling. Alternatives for the disposition of dams should address AOP and paddling access, ideally through the physical removal of dams, or alternatively through the addition of nature-like fish passage and boat portage.

4. The study does not adequately address the shift in recreational opportunities that would be available if the dams evaluated in the study were removed. The opportunity for water trail creation in this area of the country could result in significant eco-tourism and recreational benefits, provided that sufficient lengths of barrier-free river are available and accessible for paddling.

Please add me to the distribution list for responses to comments and future revisions of this study.

Sincerely,

Lisa Hollingsworth-Segedy

Lisa Hollingsworth-Segedy, AICP
Associate Director for River Restoration
American Rivers

150 Lloyd Avenue Pittsburgh, PA 15218 412-727-6130
lh-segedy@americanrivers.org www.americanrivers.org

BC WS
Butler County
Water System

March 17, 2014

Mr. Nathan Moulder
Project Manager
US Army Corps of Engineers
PO Box 59
Louisville, KY 40201-0059

Re: Green River Locks & Dams 3, 4, 5, 6; Barren River Lock & Dam 1 Disposition Feasibility Study Comments

Dear Mr. Moulder:

The Butler County Water System, Inc., (Butler Water) appreciates this opportunity to comment on the updated Green River Locks and Dams 3,4,5,6; Barren River Lock and Dam 1 Disposition Feasibility Study. As you are aware, the pool of Green River Lock and Dam No. 3 provides our only water source for providing healthy, safe drinking water to citizens we serve in Butler, Muhlenberg, Ohio, and Grayson Counties.

Butler Water is concerned with the lowering of the pool level associated with the gradual degradation of the lock and dam. As a founding member of the Rochester Dam Regional Water Commission (RDRWC), Butler Water fully supports the mission of the RDRWC to preserve the integrity of Lock and Dam No. 3 and to prevent further degradation of the pool level that is our vital source of water for the region. We therefore request that disposition of Green River Lock and Dam No. 3 be expedited with the RDRWC receiving all necessary rights and authority to stabilize and maintain the lock and dam to insure an adequate water supply for over 46,000 people in our region.

Thank you again for your efforts on this important project. If you have any questions regarding our concerns or have updates to the Disposition Feasibility Study, please contact me directly at (270)495-3491.

Sincerely,

John M. Dix, P.E.
General Manager

Kentucky KWA Waterways Alliance

120 Webster Street, Suite 217
Louisville, KY 40206
502-589-8008
www.KWAlliance.org

VIA ELECTRONIC MAIL

March 17, 2014

ATTN: Mr. Nathan Moulder, CELRL-PM-P-F
Nathan.A.Moulder@usace.army.mil
Louisville District, Army Corps of Engineers
P.O. Box 59
Louisville, KY 40201-0059

RE: Green and Barren River Lock & Dam Disposition Feasibility Study

Dear Mr. Moulder,

Please accept the following comments on behalf of the Kentucky Waterways Alliance, Inc. ("KWA", "the Alliance") regarding the Green River Locks and Dams 3, 4, 5; 6; Barren River Lock and Dam 1 Disposition Feasibility Study.

KWA is a statewide nonprofit organization dedicated to protecting and restoring the waters of the Commonwealth. KWA represents over 900 members and affiliate organizations united to insure high quality water resources in Kentucky for diverse recreational activities such as swimming, boating, and fishing as well as reliable drinking water supplies and biological habitat.

KWA's comments are on behalf of our members and citizens of the Commonwealth who value our waterways for their recreational and ecological value and for their value as a public water source. As such, our comments are focus on alternatives and strategies that provide the best outcomes for both the waterways and the communities that depend upon them.

The Green River is widely recognized as one of the more biologically diverse aquatic communities in the country. It contains over 150 fish species and over 70 mussels. Many of the riffles in the undammed portion of the Green contain excellent mussel counts. The undammed portion also serves as an extremely valuable destination for river recreation enthusiasts. But the dammed portion has restricted fish and mussel species from moving freely up and down the Green to naturally repopulate. The removal of these unnatural impediments would allow additional habitat for threatened and endangered species in the Green River. These species evolved in a riverine system and not a "lake".

In addition, a number of communities along approximately 200 miles of the Green have expressed interest in furthering the eco-tourism opportunities for the Green by pushing for designation as a Blueways trail. The continued existence of these dams restricts not only fish and mussel species from moving freely up and down the river, but also prevents such recreational and eco-tourism opportunities from being fully realized. Additionally, the continued existence of these dams represents a safety hazard for river recreation enthusiasts. There have been multiple instances of canoers and/or kayakers getting caught in the current above dams and who have been unable to prevent going over a dam and into the tailwaters, which can be very dangerous.

As we understand it, the Corps considered four alternatives for each lock and dam in the study. These alternatives ranged from no action to disposal of the properties through partial or full breaching and removal of the dams to safety and access measures. Generally, KWA would prefer Alternative 3, or the breaching and removal of all dams and filling of lock chambers in the study, but we understand the factors involved may not allow for the Corps to take such action. KWA also is disappointed that additional alternatives were not considered, such as ones that would allow for fish and mussel passage, or modified alternatives that would allow for drinking water access and partial dam removal. As such, we have the following suggestions for each lock and dam considered.

Green River Lock and Dam 3

KWA understands that this facility has been closed since 1981, and has not been repaired since 1966. There are five water intakes that utilize the pool from this Lock and Dam, and the study suggested "these intakes would not function if the dam were removed." The study also suggested that replacement of these intakes with wells is not a viable option. The study recommends alternatives 2 and 4, which would allow the lock and dam to remain, while ensuring stability and preventing access through construction of barricades. Local officials have even taken steps to acquire the property, on the basis of the water supply concerns.

KWA understands the issue of water supply. Communities have a right to access clean water sources, and KWA strongly supports the ability of these communities to maintain the Green River as their water source. However, there have been examples of lock and dam removals that included retrofitting of the water intakes to meet low or shallow-water conditions. Many communities upstream use the freely flowing Green River as a water supply. There is plenty of water in the Green for all of these communities. Furthermore, eventually, the lock and dams on the Green will fail, and will need to be removed. Communities and industry will suddenly be forced to confront their intake issue. Instead of this likely scenario playing out, **KWA suggests the Corps facilitate discussions with local entities about shallow-water intake retrofits now, and fully implement alternative 3**. We believe that investing in these retrofits will fit within the long-term needs of these communities, and will also allow for the Green to be moved ever closer to a free-flowing waterway.

Green River Lock and Dam 4

KWA understands that the dam at this site failed previously, and therefore dam removal is not necessary because the remaining parts do not affect pool level. The Corps prefers alternative 2, which would prevent access through construction of barricades, and would also allow for "historical interpretation." **KWA is amenable to this alternative, as long as the facilities are safe and the remaining dam structure does not restrict recreational opportunities on the Green River and does not hinder aquatic and ecologic functions.**

Green River Lock and Dam 5

KWA understands the dam at this site is currently stable and good condition, because it is more modern than several of the others. Additionally, this pool contains three water intakes, and replacement of these intakes with wells is not a viable option. The Corps prefers alternative 2,

which would prevent access through construction of barricades. The Corps hopes to transfer ownership to local control.

Again, KWA understands the issue of water supply. Communities have a right to access clean water sources, and KWA strongly supports the ability of these communities to maintain the Green River as their water source. However, there have been examples of lock and dam removal projects that included retrofitting of the water intakes to meet low or shallow-water conditions. Furthermore, eventually, the lock and dams on the Green will fail, and will need to be removed. Communities and industry will suddenly be forced to confront their water intake issue. Instead of this likely scenario playing out, **KWA suggests the Corps facilitate discussions with local entities about shallow-water intake retrofits now and move to implement alternative 3**. We believe that investing in these retrofits will fit within the long-term needs of these communities, and will also allow for the Green to be moved ever closer to a free-flowing waterway. Finally, we believe the Corps would recommend alternative 3 for this site, if not for the water intakes, and that is a significant rationale why we believe the Corps should proceed here with alternative 3.

Green River Lock and Dam 6

KWA understands that the dam at this site is currently in poor condition, including seepage in several locations. The Corps suggests failure is likely, if nothing is done to stabilize or remove the dam. In addition, the pool for this site has affected the natural hydrology of Mammoth Cave for nearly 100 years, and dam removal would facilitate a return to more natural conditions for Mammoth Cave system. However, this lock and dam is complicated by the existence of the ferries in this pool. The Corps has recommended alternative 3 in order to sufficiently address the safety concerns of the dam, and even though they understand the concerns for the ferries continued operation. The National Park Service also supports this alternative. As the Corp notes in the study, the NPS suggested that "the suitable habitat for a number of federal threatened and endangered species and a large number of state list species would be increased...Elimination of the pool would provide for restoration of the ecosystem and improve its long-term sustainability.

KWA fully supports the Corps preference for alternative 3 on this site. Removal of the dam, given its hazardous condition, would increase safety on this stretch of the Green, particularly for recreational canoers and kayakers. This alternative would also allow for increased aquatic habitat and restoration opportunities for the Green. KWA would also be supportive of efforts to allow the ferry to continue operations, provided that they can sufficiently avoid impacts to sensitive aquatic species with the regular dredging operations that would be required.

Barren River Lock and Dam 1

KWA understands that Corps prefers a modified alternative 3 for this site. This would involve a partial breach of the dam that would allow passage of recreational canoe and kayak traffic, and reduce overall safety risks associated with the facility. However, the Corps appears to only recommend this option due to two limitations. First, the City of Bowling Green expressed concern about the loss of this pool and the desire to potentially use this is a future public water supply. Second, the Bowling Green Municipal Utilities suggested that the loss of the pool would adversely affect their ability to meet permit limits.

Multiple times in the study document, the Corps noted it is not their responsibility to ensure public drinking water access. KWA asserts that the Corps has no responsibility to provide Bowling Green with a *future* option of utilizing the pool for this dam as a public water supply. KWA also asserts that the Corps has no responsibility to ensure the municipal treatment center can sufficiently treat and discharge its wastewater at levels that meet permit limits. Even more significant is that these two statements by city and the municipal utility are somewhat contradictory. Using this pool of water as a public water supply, while also admitting that the water treatment facility discharges levels of pollutants into that pool that are just barely allowing them to meet permit limits, seem highly conflicting. If the water is not clean enough to be used as a public water supply, then it seems the water treatment center needs to upgrade their treatment train.

KWA suggests that the Corps should implement the full alternative 3 for this facility. Doing so would allow for increase recreational opportunities and would allow for increased aquatic habitat and ecologic restoration opportunities for the Barren River.

In summary, KWA suggests in order of importance, Green River L&D 6, 5, and 3, as well as Barren River L&D 1, should utilize alternative 3, and that alternative 2 is acceptable for Green River L&D 4. The aquatic, ecologic, and recreation value that would be provided by the removal of these dams is substantially more important than the continued expense to maintain these facilities for the public water supply intakes. Further, the dams will, at some point, fail or require substantial investment to be maintained, and therefore represent an ongoing safety hazard. KWA suggests that a decision focused on both the long-term sustainability of the Green River and the long-term sustainability of the communities and industry that depend upon the Green River would certainly result in the implementation of alternative 3, at all sites except the already-breached L&D 4. The Corps should facilitate discussions with existing water intake operators regarding retrofit options that would facilitate the removal of the dams. KWA recommends contacting American Rivers, who has worked across the country advocating for and facilitating dam removal and restoration of rivers. In addition, KWA recommends contacting Laura Wildman (lwildman@princetonhydro.com) of Princeton Hydro, who has expertise in river friendly water intakes.

KWA thanks the Corps for putting the time and effort in to study the disposition of these locks and dams, and appreciates the opportunity to comment on behalf of our members and the general public. Please, contact me with any questions.

Respectfully,



Tim Joice
Water Policy Director

The Nature Conservancy
Protecting nature. Preserving life.

Kentucky Office
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Mr. Nathan A. Moulder
Community Planner
U.S. Army Corps of Engineers, Louisville District
600 Dr. Martin Luther King Jr. Place
Louisville, KY 40202

March 12, 2014

RE: Response to February 2014 Disposition Feasibility Study

Dear Mr. Moulder,

The Nature Conservancy has carefully reviewed the ***Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study*** that was completed in February 2014. Thank you for providing us with an opportunity to provide our comments. We have organized our comments on a structure by structure basis:

Green River Lock and Dam 3
With regard to the proposed disposition for Green River Lock and Dam 3, The Nature Conservancy believes further analysis must be completed before a disposition recommendation is given. We would be inclined to recommend disposition alternative 3 (removal or breaching), as we believe the USACE would also be inclined to do for this structure, were it not for concerns about existing municipal water intakes in the pool above Lock and Dam 3. The Study indicates that "removal of the dam is not recommended" because "local communities have come to depend on the pool impounded by the dam for their water supply."

There are more innovative solutions to this quandary available which should be given full consideration. These solutions may satisfy and properly balance both the conservation interests of restoring more free-flowing river miles along with the municipal water supply interests. Innovative designs for (shallow water) municipal water supply intake structures already exist. To provide some context and material for consideration, the links below provide some introductory information concerning innovative intake designs, as well as innovative methods to replace certain ecosystem services that may be affected by the loss of a low head dam:

Replacing Dam Functions When Removing a Dam
http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1070&context=fishpassage_conference

Conceptual Design For Shallow Water Intake (Potomac River)
http://www.loudounwater.org/uploadedFiles/TM9_Conceptual_Design_Development.pdf

We believe that (eventual) removal of Green River Lock and Dam 3 need not be perceived as a negative outcome for the local communities, including those communities being supplied with water from the Lock and Dam 3 pool. Were this structure to be removed or significantly breached, the eco-tourism and outdoor adventure potential for the Green River in this region would be greatly enhanced. Canoers,

kayakers, fishermen, and other outdoor enthusiasts would be able to enjoy this stretch of river as never before. A current effort to create a 300 miles long recreational "blueway" for the Green River would be supported by removal or breaching of this structure and local communities could benefit from no longer having a large, hazardous structure in the river at this location that recreational river users would have to portage around. Further, if further analysis determines that alterations to existing water intakes and/or other design modifications to replace pool functions are indeed viable, those solutions may end up being better long term options for the local communities as opposed to taking on ownership of a large, aging lock and dam that may need extensive repair work in the very near future, and ongoing ownership and maintenance costs for the expected life of that structure, in addition to the significant liability exposure that is necessarily a part of owning and maintaining such a structure.

In short, The Nature Conservancy believes that further investigation and analysis into the technologies that are available to replace dam functions is required before a disposition for this structure is recommended.

Green River Lock and Dam 4
The Nature Conservancy agrees with the disposition for this structure as recommended within the Study.

Green River Lock and Dam 5
With regard to the proposed disposition for Green River Lock and Dam 5, The Nature Conservancy believes further analysis must be completed before a disposition recommendation is given. We would be inclined to recommend disposition alternative 3 (removal or breaching), as we believe the USACE would also be inclined to do for this structure, were it not for concerns about existing municipal water intakes in the pool above Lock and Dam 5. The Study indicates that "removal of the dam is not recommended" because "local communities have come to depend on the pool impounded by the dam for their water supply."

We believe that a more innovative solution to this quandary may be available, a solution that may satisfy and properly balance both the conservation interests of restoring more free-flowing river miles along with the municipal water supply interests. Innovative designs for (shallow water) municipal water supply intake structures already exist. To provide some context and material for consideration, the links below provide some introductory information concerning innovative intake designs, as well as innovative methods to replace certain ecosystem services that may be affected by the loss of a low head dam:

Replacing Dam Functions When Removing a Dam
http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1070&context=fishpassage_conference

Conceptual Design For Shallow Water Intake (Potomac River)
http://www.loudounwater.org/uploadedFiles/TM9_Conceptual_Design_Development.pdf

We believe that (eventual) removal of Green River Lock and Dam 5 need not be perceived as a negative outcome for the local communities, including those communities being supplied with water from the Lock and Dam 5 pool. Were this structure to be removed or significantly breached, the eco-tourism and outdoor adventure potential for the Green River in this region would be greatly enhanced. Canoers, kayakers, fishermen, and other outdoor enthusiasts would be able to enjoy this stretch of river as never

before. A current effort to create a 300 miles long recreational "blueway" for the Green River would be supported by removal or breaching of this structure and local communities could benefit from no longer having a large, hazardous structure in the river at this location that recreational river users would have to portage around. Further, if further analysis determines that alterations to existing water intakes and/or other design modifications to replace pool functions are indeed viable, those solutions may end up being better long term options for the local communities as opposed to taking on ownership of a large, aging lock and dam that may need extensive repair work in the very near future, and ongoing ownership and maintenance costs for the expected life of that structure, in addition to the significant liability exposure that is necessarily a part of owning and maintaining such a structure.

In short, The Nature Conservancy believes that further investigation and analysis into the technologies that are available to replace dam functions is required before a disposition for this structure is recommended.

Green River Lock and Dam 6

With regard to the proposed disposition for Green River Lock and Dam 6, The Nature Conservancy fully agrees with the recommendations outlined in the report calling for a federally-funded removal of the dam, in association with the modifications that would be required to keep the two river ferry locations in an operational condition. We believe this is a critically important step forward in returning the Green River to a more natural condition which will be more conducive to the recovery of a number of a listed aquatic species, including several species of freshwater mussels. The exceptionally unique ecosystems within Mammoth Cave National Park would also benefit from the removal of Green River Lock and Dam 6, as has already been noted by the Mammoth Cave staff and management.

Barren River Lock and Dam 1

With regard to the proposed disposition for Barren River Lock and Dam 1, The Nature Conservancy disagrees with the recommended disposition. We believe disposition alternative 3 is more appropriate, which would include removal or breaching the dam in association with other measures to ensure the structural integrity and safety of the lock. The Study indicates that the Corp's first inclination for this site's disposition would have been a variation of Alternative 3, which would have included constructing a 135' wide breach in the dam which would provide for safe recreational canoe and kayak traffic through the breach area. As noted by the Study, this structure does **not** provide a pool that is utilized for municipal water usage, and the Study states that "the public water supply would not be threatened by lowering the pool." For the reasons outlined above, we would fully support this alternative 3 dam breach disposition.

However, the Study goes on to say that the Warren County Judge Executive informed the USACE that "while the City of Bowling Green does not have a water intake in the pool formed by the dam at Barren River Lock and Dam No. 1, Bowling Green and Warren County regard the pool as a potential source of water." It is our contention that this is not an acceptable reason to expect that the Barren River Lock and Dam 1 be kept in place for perpetuity. As has already been stated on page 18 of the Study:

> *The locks and dams were built for the sole purpose of facilitating navigation, and providing water for water supply is not an authorized purpose of these projects.*

We understand where this may be more of a concern in areas where communities have already been reliant for years, even decades, on the pool created by such a structure. But in this case the need is being presented as a future need...which in our view means that now is the time to explore other water

supply and conservation options other than increasing water supply reliance on an aging, potentially dangerous structure that was never intended to fulfill water supply needs in the first place.

The Nature Conservancy believes that the City of Bowling Green and Warren County should consider a suite of water-conservation practices and policies that may reduce the overall water demands of the community. Many other communities around the country located in regions where water supply has always been an issue have formidable public-outreach campaigns to inform and educate the populace about common-sense water conservation measures.

As part of our own process to craft our response to this Study, we visited the Bowling Green Municipal Utility (BGMU) website to look at the water conservation information that BGMU might already be making available to their customers. To our surprise, we found virtually no information whatsoever regarding water conservation practices for consumers. The only such material was found on the "BGMU Kids" website where a handful of simple tips such as "Don't leave water running; be sure to turn it off when you are finished" and "Keep a pitcher of water in the refrigerator" are presented to what one would presume to be an audience of children. We also called BGMU on February 28 and asked if there were any water conservation brochures or flyers which were available for the public to pick up so they could learn more about water conservation. The operator did not know the answer to this question, and referred us to "Kathy" in Marketing. We left a voice message for Kathy asking for the same information and to-date, have not received a return call. We also sent an email to Tim Slattery with the City of Bowling Green and Doug Kimbler with BGMU asking what kind of water conservation outreach/education program they have in place. Mr. Slattery responded by saying that "*The City has had a public outreach program for 10.5 years, but we have never really focused on conservation, our aim was to get people to do things to improve water quality (pick up after your pet, don't dump oil, grease paint...) But conservation is something I will include in future publications.*" Mr. Kimbler responded by saying that "*BGMU includes water conservation as part of our outreach to the public. This includes information provided on tours and presented to various public groups including schools. Our Customer Service group has brochures available, I don't have any available electronically.*"

There are many communities and water utilities in water-strapped locations around the country that put significant resources into their water conservation outreach and education programs. We believe that BGMU and local governments should increase their efforts in this regard to help encourage active, voluntary water conservation within the community. Each gallon of water thus conserved represents a gallon of water that does not have to be drawn from the finite waters of the Barren River.

Another conservation approach (other than outreach) that we wish to address is the use of an inclining water rate schedule to encourage water conservation, and to discourage excessive water consumption. We have attached a copy of a document produced by the Southwest Florida Water Management District (SWFMD) that addresses how a water utility can reduce per capita water use and maintain revenues by using a an Inclining Block Rate fee structure. Essentially, this method of billing for water sets a lower price for the first "set" amount of water that a customer will use. As the water usage of the customer increases, the rate for that water goes higher as certain volume thresholds are exceeded. So for example a customer might pay $4 for their first thousand gallons of water...but then pay $5 each for the second, third, and fourth thousand gallons of water...then $6 each for the fifth and sixth thousand gallons of water, etc. SWFMD conducted a study that shows that "water use decreases with increases in water price" and that "the decreases are predictable and statistically valid." *Bear in mind these*

*conservation benefits come from the use of an **inclining** rate structure, where the cost paid for water increases with usage.*

We evaluated the current water billing rate structure for BGMU. To our surprise, we discovered that BGMU actually uses a ***declining*** rate structure, where a customer pays a decreasing amount per gallon of water as the water usage of the customer increases! This is the most recent rate schedule we could obtain for BGMU water rates:

During the period July 1, 2012 through June 30, 2013, the basic rates shall be:

	Water Rate		Sewer Rate	
	Inside City	Outside City	Inside City	Outside City
Customer Charge:	$3.20	$4.48	$3.02	$4.23
Volume charge (per ccf/month):				
First 20 ccf	$2.54	$3.56	$3.17	$4.44
Next 230 ccf	$2.36	$3.30	$3.17	$4.44
Over 250 ccf	$2.03	$2.84	$3.17	$4.44

"ccf" means hundred cubic feet, or 748 gallons

The declining rate schedule above runs contrary to the inclining rate schedules that have been extensively studied and adopted by water utility operations in other locales where scarcity of water is even more of a concern than in south central Kentucky. We asked about their current rate structure, Mr. Kimbler with BGMU stated "*We do use a declining rate schedule at this time. In the past, this structure had several levels, or tiers. This has been compacted at this time to three tiers. This may change in the future.*"

Another quote from this Feasibility Study indicates that the USACE "also had contact with Bowling Green Municipal Utilities during the 2004 Study" and that "their concern is that the loss of the pool would adversely affect the city's ability to meet pollution control requirements." We believe that situation may have changed for the better since 2004, perhaps due to the award-winning advancements that have been made with regard to the BGMU wastewater operations. At a Green River Summit meeting on February 21, 2014, Mike Hensley (TNC's Green River Project Director) had an informal conversation with the aforementioned Mr. Kimbler about the presence of Barren River Lock and Dam 1, and what it might mean for the utility if that structure were no longer there. Mr. Kimbler stated to Mr. Hensley that if the dam were no longer there, the fact that the currently-existing pool would be replaced with swifter, free-flowing current would actually be a *benefit* to the current BGMU waste-water operations.

To conclude our comments regarding disposition of Barren River Lock and Dam 1, The Nature Conservancy believes there are significant steps that the City of Bowling Green, Warren County, and BGMU could take to encourage and reward water conservation in both the residential and commercial water consumer populations; we would be happy to work with BGMU and others in this regard. We would want to see such steps actively pursued by the local authorities before any effort might be undertaken to put a second water intake into the pool created by Barren River Lock and Dam 1. We believe the proper disposition for Barren River Lock and Dam 1 is the Alternative 3 variant which calls for a 135' breach to be constructed. Significant environmental benefits would be enjoyed as a result of opening up many miles of the Barren River to an original, free-flowing condition. In addition, recreational canoe and kayak enthusiasts would be able to enjoy this scenic stretch of river as never before.

In summary...we thank you for all of the hard work the USACE has put into this important Disposition Study, and for providing us with the opportunity to provide input. We also want to thank **all** of the communities and individuals who also shared generously of their own time and expertise to provide input for this Study...whether we happen to agree or disagree with sometimes differing perspectives! The Green River basin is home to an incredibly diverse group of stakeholders, and The Nature Conservancy will always be willing and ready to continue these discussions to share ideas, address concerns, and develop the best path forward.

Sincerely,

Michael S. Hensley
Green River Project Director
The Nature Conservancy
255 Sims Cemetery Road
Canmer, KY 42722

Attachment: Southwest Florida Water Management District Brochure



Rochester Dam
Regional Water Commission
P.O. Box 207
124 E. Washington Street
Hartford, Ky 42347

March 13, 2014

Mr. Nathan Moulder
Project Manager
US Army Corps of Engineers
PO Box 59
Louisville, KY 40201-0059

Dear Mr. Moulder:

The Rochester Dam Regional Water Commission (RDRWC) has reviewed the Green River Locks and Dams 3,4,5,6; Barren River Lock and Dam 1 Disposition Feasibility Study. As we expressed previously to Ms. Veronica Hiriams of your organization and as acknowledged in the study, the RDRWC is interested in leasing or acquiring rights to the Green River Lock and Dam No. 3.

The mission of the RDRWC is to ensure an adequate and dependable supply of water for the region which derives its water supply from Pool 3 of the Green River. This pool is the only water source for over 46,000 people and supports over 18,000 jobs in Butler, Muhlenberg, and Ohio counties. Due to the critical importance of providing safe, healthy drinking water to the region, the RDRWC requests that the US Army Corps of Engineers (USACE) include the following as a part of the Disposition Feasibility Study:

1. Eliminate any alternative that would allow continued degradation or elimination of the dam or that would impede the ability to sustain Pool 3 at the original design pool elevation. The loss or lowering of Pool 3 would have significant and severe economic consequences to the region.

2. Expedite the repairs to the Lock to ensure human safety and prevention from failure. The RDRWC requests that we be included in the review and approval of all proposed repairs and safety measures to the Lock.

3. The RDRWC is concerned with the long-term stability of the Lock and Dam No. 3, and we request that the disposition process be accelerated by the best methods available.

Thank you again for your efforts on this important project. We look forward to working with USACE to protect the Green River Lock and Dam No. 3 and to best serve the interests and welfare of the citizens in our region. If you have any questions regarding our concerns or have updates to the Disposition Feasibility Study, please contact John Dix at (270)842-0052.

Sincerely,

Linda Keown

Linda Keown, Chair
Rochester Dam Regional Water Commission

CC: Senator Mitch McConnell
Senator Rand Paul
Representative Brett Guthrie
Representative Ed Whitfield
Muhlenberg County Judge/Executive Rick Newman
Ohio County Judge/Executive David Johnston
Butler County Judge/Executive David Fields

From: WDB / Square Deal
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green River Lock and Dam #6
Date: Monday, March 17, 2014 1:26:29 PM

My wife and I live in Barren County, Kentucky just outside Park City. We have enjoyed the recreational benefits of Mammoth Cave National Park and the stretch of the Green River within the Park for many years. Removal of Lock and Dam #6 would be beneficial to MCNP users from a recreational perspective. But, far more importantly, removal of the lock and dam would start the process of reversing the effects the dam has had on the Mammoth Cave ecosystem. Mammoth Cave is a natural wonder and we need to be doing all that we can to preserve it in its natural state.

William D. Bucher

25921 Louisville Road

Park City, KY 42160

From:	Moulder, Nathan A LRL
To:	Moulder, Nathan A LRL
Subject:	FW: [EXTERNAL] Louisville District Contact Form: removal of dams along green and barren rivers (UNCLASSIFIED)
Date:	Tuesday, March 18, 2014 12:12:56 PM

Classification: UNCLASSIFIED
Caveats: NONE

-----Original Message-----
From: noreply@dma.mil [mailto:noreply@dma.mil]
Sent: Monday, March 10, 2014 1:32 PM
To: LRL-Pagemaster-OP LRL; troyandjulia@bellsouth.net
Subject: [EXTERNAL] Louisville District Contact Form: removal of dams along green and barren rivers

This message was sent from the Louisville District website.

Message From: Troy Tabor
Email: troyandjulia@bellsouth.net
Response requested: Yes

Message:

I am opposed to the removal of dams along the Green and Barren Rivers in Kentucky. Aquatic life below the dams have adjusted to the dams and removing the dams may upset the current aquatic life systems that are currently in place. I have caught and released darters with cast nets down below the dams and believe them to be healthy in their current environment. The dams create some great fishing spots along the rivers and their removal would take away some of my most productive fishing locations. I talk to fishermen quite frequently along the rivers and no one that I have spoken to is in favor of removing the dams.
Although some kayaking companies may benefit on a very small scale, the local economy as a whole would not be improved enough to offset the costs of removing the dams.
I understand that the Corps has no regard for fishing in the Commonwealth's rivers or waterways, but the Corps should take into account aquatic life and environmental factors and how the removal of the dams could cause upset conditions along the waterways. If these dams are left in place, decades from now, they will most likely still be in place. Please concentrate your efforts and federal expenditures toward something more useful than tearing out dams.
Thank you for the opportunity to comment,

Troy Tabor

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

From: Thomas Smith (ConAgra Foods)
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green River Dam removal
Date: Monday, March 17, 2014 9:12:54 AM
Attachments: image003.png
image004.jpg

Mr. Moulder:

I am in favor of the removal. The best reasons are the return to free flowing status, for paddling and the biodiversity boost of moving water.

Thank you for this consideration.

Tom Smith

40242

cf-love-2clr-rgb-v.jpg

Tom Smith

One Quality Place

Buckner, KY 40010

502 222 2728
thomas.smith2@conagrafoods.com

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From: Thomas Dotson, TDTools
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Comments for Disposition and Feasibility Study
Date: Monday, March 17, 2014 6:02:05 PM

Nathan,

I have a comment that I would like to have included for the Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 Disposition Feasibility Study.

"We are currently conducting feasibility studies for the production of hydropower for lock and dam facilities on the Green and Barren River. We would like to know the impact of the study on our potential projects, specifically the following items:

1. How is a FERC preliminary permit impacted by the disposition report. For example, Green River #5 lock and dam facility currently has a preliminary permit from FERC, how will this permit impact decision making for the site?

2. Would a permit holder be given consideration for access to the facilities if they are suitable for power generation?

We would appreciate the opportunity to discuss with the appropriate personnel.

Regards,

Ben Smith and Thomas Dotson

Directors

Green Head Power"

Please let me know if this is sufficient for a comment.

Regards,

Thomas

Thomas Dotson

TD Tools

11850 Nashville Rd.

P.O. Box 130

Woodburn, KY 42170

270-368-0002 (office)

270-784-6922 (cell)

866-312-8430(fax)

tdotson@sandjetperf.com

www.sandjetperf.com

From: Steve Murray
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Re: Green & Barren River Locks (Kentucky)
Date: Monday, March 10, 2014 9:48:29 PM

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*Overstated, not understated.

On Mon, Mar 10, 2014 at 6:47 PM, Steve Murray <akastevemurray2@gmail.com> wrote:

I'm happy to see the disposition of these locks be brought up. The biosphere of the Green River is incredibly unique, and has seen enough damage over the past few centuries. I fully support and applaud any effort to renew this waterway by returning it to natural flow patterns over a large stretch of river.

While my interest as a caver plays a part in my support, the return of natural flow patterns to this river is far more important in terms of preserving the biosphere of a World Heritage Site. The importance of removing these locks and dam can't be understated.

From: Scott Newsome
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] dam 6
Date: Monday, March 17, 2014 4:44:25 PM

Nathan Moulder,

I support the removal of Dam 6 near Mammoth Cave National Park and restoring that pool of river to it natural free flowing beauty. I have paddled the Green river now for almost 50 year and would to see it as it should be before I die. Thanks for all your work.

Scott Newsome

From: Labashosky, Carol J LRL
To: Babey, Amy S LRL
Cc: Moulder, Nathan A LRL; Turner, William M (Michael) LRL
Subject: FW: Public comment forward on Green River Dispo Study from Ops (UNCLASSIFIED)
Date: Monday, March 17, 2014 9:32:36 AM

Classification: UNCLASSIFIED
Caveats: NONE

Ay,

Can you make sure Nate includes this public comment for his Green River Study? I realize he is out of office.

Carol Labashosky
Public Affairs Specialist
U.S. Army Corps of Engineers Louisville District
(502) 315-6769

facebook.com/louisvilleusace

-----Original Message-----
From: Labashosky, Carol J LRL
Sent: Monday, March 17, 2014 9:31 AM
To: Moulder, Nathan A LRL
Subject: FW: Public comment forward on Green River Dispo Study (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Nate,

Did Mike Turner forward this public comment at the bottom of the email to you for the report from Ricky Parnell? Mike Turner was on distribution.

Just making sure it gets to you...

Thanks,

Carol Labashosky
Public Affairs Specialist
U.S. Army Corps of Engineers Louisville District
(502) 315-6769

facebook.com/louisvilleusace

Message From: Ricky Parnell
Email: parnellricky92@yahoo.com
Response requested: No

Message:

My concern is taking out lock 6 at Brownsville , would that make the river to shallow to travel by boat with a motor ? I have went fishing in Green River for about 40 yrs. I usually used the ramp at Green River Ferry. And in the summer months when the river is at summer pool its hard to travel up and down with a motor boat. There are some location where the river is getting wider and the water is getting shallow.

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

From: Pat Vogelsberg
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green River Dams
Date: Monday, March 17, 2014 4:30:40 PM

I would like to go on record as opposing any dam removals on Green River. I think that the impact on the local residents far outweighs the benefits of removing the dams. As a landowner near Rochester, I would expect compensation for any property value reduction that would occur as a result of their removal. I hope some consideration has also been given to the negative impact on recreation that would also occur as a result of lowering the water levels in these pools.

In closing let me say that it is a shame that maintenance on these dams was ignored for so long and that they were allowed to rot away. A small amount of attention regularly would have been much cheaper than the numbers we are talking about today.

Sent from my iPad

From: AWhittle@aol.com
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Fwd: Green river lock anddam disposition
Date: Thursday, March 13, 2014 3:33:27 PM

From: AWhittle@aol.com
To: Nathan.A.Molder@usce.army.mil
Sent: 3/13/2014 3:15:00 P.M. Eastern Daylight Time
Subj: Fwd: Green river lock anddam disposition

From: AWhittle@aol.com
To: NathanA.Moulder@usace.army.mil
Sent: 3/13/2014 10:29:17 A.M. Eastern Daylight Time
Subj: Green river lock anddam disposition

comments on draft report.

1.will any plan cause increased erosion on Nolin River that will impact the old barge building facility remains?

2.Any safety issues for canoes on Green River while discharging from Nolin Lake, if dam 6 is removed.

3.is there a commercial mussel fishery impact any where on Green River?

4.The issue on closing ferries. During the acquisition of property for the mammoth cave park the people of Edmonson County were assured that the transportation system would remain open and maintained by NPS.

Then in the 1940's or early 1950's NPS tried to close the mammoth cave ferry for safety reasons. the ferry was located over the hill below the " old cave entrance". the federal judge ruled that the ferries are part of the transportation system and must remain in operation. NPS then moved the ferry down stream to a safer location. This is now in more tranquil waters and the approaches are much safer.the ferry is now called green river ferry in your report.

A cursory look at operating the ferries with dam 6 removed indicate that no safe plan has been derived.Some say that NPS should "take over" maintenance of dam 6 to insure the that dam remains viable for operating the ferries in a safe manner.

Noah M. Whittle
retired , Chief Engineering

Division

Louisville District

From: Wilson, Neil M
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green River Lock and Dam #6
Date: Thursday, March 13, 2014 12:06:33 PM

Nathan,

I am writing to voice my support for the decommissioning of the locks and dams along Green River, but particularly my support for eliminating lock and dam #6. I strongly support Alternative 3 which would include eliminating the dam and stabilizing the lock. I have been down the road that leads back to the area adjacent the lock and dam, and I can say that it is most certainly an eyesore at best, and a potential liability at worst. It is clearly a dumping ground for unscrupulous locals and a "hangout" at nights and on the weekends. Garbage is strewn about the entire area and there are a number of "user-made" trails that venture off towards the lock and dam and the river bank. I see no reason for the USACE to maintain "caretaker" status of this property.

Additionally, I support Alternative 3 for the recreational opportunities that would be improved. Although the damn creates a pool for a significant distance upstream into the national park that allows many people access by motorboat for fishing, I would much rather see the river level returned to its natural baseline flow. For me personally, this would create a much better paddling and smallmouth bass fishing experience coming through the national park and approaching the confluence of the Nolin River. With the recent increase in "adventure tourism", I feel like a more lively river section from Green River Ferry past Brownsville would increase interest in paddling and offer a more "authentic" outdoor experience. My family owns some property just upstream of lock and dam #6 with about 1100' of river frontage, and I can say that most of the year the river in this area is a disgusting, trash filled, muddy pool that frequently floods over our lower floodplain forest. I would love to see the dam removed and the river level drop to a more "natural" level.

I also believe there would be tremendous benefits for aquatic life from implementing Alternative 3 by restoring a more natural pool and riffle system. Given the overall amount of biodiversity and the sensitive species that occur in this stretch of river, I can find no reason to avoid returning the river to a more natural flow pattern. Additionally, lock and dam #6 is probably the most deteriorated of all of the dams in this study, and would be the best candidate for removal rather than stabilization and repair. I firmly believe that Alternative 3 offers the most long-term benefit for all the stakeholders involved as well as the most benefit from a wildlife and ecosystem services perspective. I hope that you will take my opinions into consideration when making the final decisions for these dispositions. Thank you very much for your time and I look forward to hearing the outcomes of this feasibility study.

Sincerely,

Neil M Wilson

Neil Wilson
Research Analyst
Department of Horticulture
University of Kentucky
Horticulture Research Farm
4321 Emmert Farm Lane
Lexington, KY 40514
859.272.5513
cell: 502.500.9898
email: neil.wilson@uky.edu

From: kurzendoer@aol.com
To: Moulder, Nathan A LRL
Cc: patandaj@bellsouth.net; jeff.carlisle@dauenhauerplumbing.com; signsincdk@aol.com
Subject: [EXTERNAL] Green River Lock and Dam Proposal
Date: Monday, March 17, 2014 11:58:12 AM

Nathan -

I just wanted to comment briefly on the Corps Plan for Green Rive Lock and Dam proposal for 3, 4, 5 & 6 and Barren River Dam 1.

Just so you know my background, I own with 2 other partners some recreational hunting property near Dam 3 in Rochester. We use it to deer, turkey and duck hunt. In particular we rely on the regular flooding of Green River to fill our potholes for duck hunting. In addition, we use all the pools produced by Dam 3 in particular but also the Brownsville Dam for summer fishing.

1) I am particularly interested in Dam 3 as it enhances our property. But here are my notes:

* Dam 3 is used for the municipal water supply for Morgantown and Rochester and should be maintained for these communicties. I get water from this system.
* Dam 3 is used for recreational boating and fishing. Dam 3 is an needed to continued current use by these folks
* Dam 3 could be turned over to the Rochester Dam Region Water Commission. I am pretty sure that repairs to the dam are necessary and federal funding should be found to help support repair to the dam, at the same time that the lock is filled.

2) Dam 6 at Brownsville -

* I understand the concern around Dam 6, but believe it offers a significant benefit to the fishing community. I know several fishing enthusiasts who rely on this pool for muskie smallmouth and crappie fishing. I hate to see this habitat destroyed.

3) Other dams - I think the surrounding populations of recreational users - mostly boaters and fishermen would suffer from the loss of any of the dams. Additionally believe there would be costs to local governments and the stare of KY to build bridges and roadways to connect roads currently serviced for ferries

4) As for the argument of the blue river trails and opening up the river for canoes and kayakers - I would say this is hogwash. In my past 13 years of owning property, I have yet to have seen a single recreational canoeist on our stretch of the river. They just are not there.

Thanks
Marty Kurzendoerfer
31008 Morning Park CT
Louisville, KY 40220
502-499-0250

From: KEYG8@aol.com
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green river dams demolition project
Date: Tuesday, March 11, 2014 9:22:32 PM

Hello my name is Martin G. Key I live @ 30 tyne ave bowling green ky. 42101 I have lived here in bg ky all of my life except for the time I was in the united states army combat engineers. I think it would be a grave mistake to loose those dams if you will go to the riverside ky. area and see what the loss was when we lost the woodbury dam. I was a baby when I started giong down there with my late father fishing camping and having a great time in nature seeing people that was doing the same as me , but now ever since the woodbury dam broke it devastated that part of green river I bet if you checked that part of the river you wont find the same amount of aquatic life you find in the deeper more calmer waters. also when the water level goes down ,the banks and the trees fall in the river the errosion sets in lots of farm land is lost in the river . Also in the summer / fall seasons this part of the river goes almost dry it is almost impossible to navagate the river in a fishing boat in any season .think a lot more people rely on green river than one group of people I hate to see this mistake happen .I think the engineers that had the dams built had the rivers best intrest in mind. if the corps dont want to take care of the dams why dont they turn them over to the electric producers so they can put turbines in them and make free electricty without coal power no smoke stacks

Thank you very much for your time
Martin G. Key
keyg8@aol.com

From: mark
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green River Dams Removal Proposal
Date: Wednesday, March 12, 2014 11:48:14 PM

I would like to submit a brief comment regarding the recently publicized proposal to remove dams in Green and Barren Rivers. I spend many days each years canoeing, primarily on Barren River and its tributaries, fishing mostly for smallmouth bass. I have also canoe fished the pool above Lock 6 on Green river. I have several boats and canoes, including a bass boat that I could fish in the # 6 pool, and have fished out of this boat several times in the Greencastle pool. But for me canoe fishing is more enjoyable and for years I have wished these two dams were gone and the river returned to the shallow free-flowing gravel and riffle stream like lower Barren is now.

The "do nothing" alternative does not appeal to me, but the barrier then disposition alternative especially does not; the fishing public likes and uses these areas a lot despite the inherent risks. Barriers are ugly, vandalized, collect debris and eventually prove to be ineffective, people feel they have a right to fish these areas and will find a way to do so. I am in favor of removing all of the dams, hoping for more smallmouth habitat, but I don't think it will ever happen; the Rochester pool being the primary water source for Ohio and Butler counties, as well as Perdue chicken processing plant in Cromwell .Likewise for the Greencastle pool, Bowling Green/Warren County will likely claim future growth will necessitate the pool as a public water source although getting an intake to the pool would be a considerable undertaking.

At the very least, I personally would like to see the # 1 Dam at Greencastle removed, followed by the # 6 Lock and Dam, with small boat ramps or access points left after the de-construction work has been completed.

In an age where natural habitat is rapidly vanishing, it would be good to see some restored. Thank you taking time to read and consider my comments, Mark Ross 974 Rochester Rd. Beaver Dam Kentucky 42320

From: Marie Spencer
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Green River Lock & Dam number 6
Date: Monday, March 17, 2014 2:24:03 PM

I strongly suppport the removal of Green River Lock & Dam #6. Clearly, the L&D system was important when river traffic was a major transportation mode, but it is generally outmoded today. Letting the river reclaim its natural terrain will benefit us, in terms of animal life, green space and water quality. I believe any potential loss of ferry revenue will be compensated by greater use of the area and the ecological benefits of a healthier river. Thanks for listening to my comments.

Cordially yours, Marie O. Spencer (Louisville 40222)

From: Laura Darnell
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Public Comments - Green River Locks and Dams 3, 4, 5; 6; Barren River Lock and Dam 1
Date: Monday, March 17, 2014 4:11:59 PM

Hello,

I would like to express my support for the proposed dam removal or dam de-activation along the Green River. The Green River in this area is an outstanding biological resource and supports numerous rare and endangered species, particularly mussels. Mussels have been having sustained population declines over several decades, and I feel that without some interventions to restore natural river flows, several endangered species are likely to become extinct.

I feel that restoring natural flow patterns to the river would be a worthwhile use of public dollars and would provide a good return on investment from biodiversity recovery. This is a unique opportunity to have a powerful impact on habitat quality, especially since the dams no longer serve their original purpose and now present safety hazards.

Thank you,

Laura Darnell

Louisville, KY 40217

From: Judy Carney
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Dam 6
Date: Monday, March 17, 2014 4:00:34 PM

I support removing Dam 6 and restoring Mammoth Cave and it's environs to a more natural state. Hopefully the ferry issue can be resolved. Would a bridge be out of the question?

Thank you,

Judy Carmey

Sent from my iPhone

From: Davis, John, B
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Dam removal (sorry couldn"t resist)
Date: Wednesday, March 12, 2014 8:00:28 PM

Mr Moulder,
I wanted to leave a comment in favor of the removal of the lock and dam system on Green River. I believe whatever we could do to return the river to its natural state would be better for the environment and, in the long run, better for the citizens of the commonwealth. I'm sure you have 10 different papers on your desk about how free flowing rivers benefit species biodiversity, fisheries etc. so I'll stop there. It's also exciting from a recreation stand point. I try to get out in the kayak when I can, and the possibility of kayaking into Brownsville excites me. A short trip from houchins ferry or a longer trip down the Nolin just to start. I am also a caver, Cave Research Foundation member, employee (cave guide) at Mammoth Cave NP, and member of the Hart of Ky NSS grotto. The idea of what might be uncovered and what we might learn from the "dam" removal is just amazing. In addition all the reasons I listed above are reasons this is good for tourism and recreation and in turn the economy of one of the poorest counties in Kentucky. Thank you for you time.

John Davis

From: Jim Wilson
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Future of Green River Lock and Dam #6
Date: Friday, March 14, 2014 10:56:19 AM

Dear Mr.Moulder,

Thank you for the opportunity to comment on the feasibility study affecting the future of Green River Lock and Dam #6 in particular.

As a Brownsville property owner directly affected by the results, I strongly support Alternative 3. It makes no sense to leave the property in a slowly deteriorating state, or to spend taxpayer money on repairs.

Alternative 3 would help the local economy around the Brownsville area. I firmly believe it would help Mammoth Cave National Park in a number of ways, and provide long-term stewardship of the property, also assisting the local economy once more.

Alternative 3 offers a real solution with beneficial lasting effects for all involved.

Thank You,

Jim Wilson

From: Gregg Hovious
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Dams
Date: Monday, March 17, 2014 6:56:13 AM

My comment is that the US government shouldn't spend a taxpayer penny to do anything with these worthless dams and should completely butt out of anything to do with Green River and Barren River.

Gregg Hovious
502-588-2010

From: Gary Hazel, President of 4NSICS2 SECURITY CONSULTANTS INC.
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Disposition Study
Date: Thursday, March 13, 2014 3:04:14 PM

MR. Nathan A. Moulder,

I am writing this email in response to the Green and Barren rivers disposition study for public inquiry ending on 3-17-14.

Although I have expressed my own personal feelings too you on the telephone I would like to have this letter in place too confirm that I am in support of the U.S. ARMY CORP of Engineers decision to place the real estate surrounding the Barren river lock and dam #1 located in Warren County Kentucky; into a public purchase market.

Moreover, I would like to be the first person in line to purchase the real estate included in the zones that may be for sale after all other entitled State or local entities have precluded themselves from interest.

Concluding, I have invested childhood memories of the dam and river more than anyone else as I grew up there in the cabins that my father helped to build.

Respectively, GARY HAZEL..

From: Emmanuel Fields
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Dam
Date: Monday, March 17, 2014 5:00:03 PM

I support dam being removed thank you

Sent from my Galaxy S®III

From: David Trowbridge
To: Moulder, Nathan A LRL
Subject: [EXTERNAL] Lock and Dam No. 6
Date: Monday, March 17, 2014 4:31:48 PM

I support removing Lock and Dam No. 6 on the Green River.

David Trowbridge
Quest Outdoors
2013 Cobalt Dr.
Louisville, KY 40299
502-267-1855
dave@questoutdoors.com

From:	David Hegland
To:	Moulder, Nathan A LRL
Subject:	[EXTERNAL] Green River Dams
Date:	Tuesday, March 18, 2014 8:22:11 AM
Attachments:	image001.png image002.png image003.png image004.png

US Army Corps of Engineers

PO Box 59

Attn: Nathan A. Moulder

Louisville, KY 40201-0059

Dear Mr. Moulder

I've just read about the proposed work on the Green River. As a longtime fan of and cheerleader for Mammoth Cave National Park, I am glad to hear this work is planned. I think it is worth the cost and effort to remove the dams, fill the lock chambers AND lower the drinking water intakes. If there were a fund for public contributions directly to the project I would gladly donate.

Thank you for your time, and Godspeed!

:D dave

David Hegland
Senior Manager, SCM
Fieldglass, Inc.

630-399-1089

dhegland@fieldglass.com <mailto:dhegland@fieldglass.com>

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John Wayne Smith
P.O Box 82
Smiths Grove, Kentucky 42171

March 12, 2014

Mr. Nathan A. Moulder
US Army Corps of Engineers
ATTN: CELRL-PM-P-F
P.O. Box 59
Louisville, Kentucky 40201-0059

Mr. Moulder,

I am writing to express my strong concern for the current plans relating to the disposition or removal of Green River Lock and Dam 6 (GRLD6). I fully support the resolution of the Edmonson County Fiscal Court opposing this effort as identified.

Actions affecting the well-being of citizens, economic and budgetary impacts between agencies of the government require a broader assessment of any current change at GRLD6. Our government, through the National Park Service, made a commitment to the citizens of Edmonson County when 25% of the county was annexed for the national park. One commitment was a reimbursement to offset proceeds lost due to the loss of revenue creating properties. The payments have not kept pace with the lost revenues! Additionally, there is a legally binding requirement to maintain operational ferries on Green River to support transit of the Green River North and South. Removal of GRLD6 places both ferries at risk of closing due to low water levels created by this removal. The action of the US Army Corps of Engineers should not create a means through which the agreement of the National Park Service is obviated.

The removal of GRLD6 places the operation of the Edmonson County Water system at risk for long term silt and sediment entering the pumping and filtration systems. Natural sedimentation has occurred for the life of the dam upstream. Removal of the dam and allowing the stream to agitate this sedimentation will create constant turbidity at the system inflow station. Removal of the dam, with no sediment mitigation, will create constant abrasive wear on pumping equipment and increased strain of the pump station filtration system. While this may be an unintended consequence of the project; it is a very real and expensive proposition to the Water System and those served.

Permanent bridging at the two primary ferry sites would eliminate the need for Ferry operations. This alternative would relieve the National Park Service from any ferry considerations, meeting the need of the existing agreement with the citizens of Edmonson County. It has been indicated, based on the projected reduction in water levels upstream, that the US Army Corps of Engineers is willing to dredge the ferry sites to keep them open during low water times. When the county proposed an arched span bridge system for the site; it was advised that pier construction for supports would be detrimental to muscle species in the watershed. It is counterintuitive that the onetime minimal intrusion to construct bridge piers is less desirable than constant dredging of the river bed from bank to bank, and wide enough to maintain the required ferry pool between rain periods? A collaborative effort between the National Park Service and the US Army Corps of Engineers to design and construct this bridging seems a viable solution.

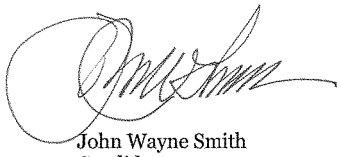
An additional responsibility of the US Army Corp of Engineers is maintenance of river flows to mitigate severe flooding downstream. Our systems of dams and lakes have eliminated most flash flooding situations entirely. I would propose that reinforcing GRLD6 with stone mass and a means to limit flow keeps all current processes in play and reinforces the structure of GRLD6.

Actions taken by the federal government, while well intentioned at one level, too often places undue requirements and unfunded mandates on the local population. If GRLD6 must be eliminated, then the federal government should accept responsibility to replace ferry operations with adequate bridging to support the traffic impacted and provide a solution to the Edmonson County water system to eliminate unintentional burdens.

I would not begin any property disposition actions until such time that all secondary and tertiary efforts are completely reviewed, as access over the new owner's property may be required.

I urge additional consideration of these expressed concerns as you proceed with this project.

Thank you for your consideration.



John Wayne Smith
Candidate
District 19, Kentucky House of Representatives
270-784-1088

Cc:
Congressman Brett Guthrie, 1001 Center Street, Suite 300, Bowling Green, KY 42101
Judge N. E. Reed, Edmonson County Judge Executive, 110 E. Main Cross Street, P.O. Box 353, Brownsville, KY 42210
Mr. Bill Canty, Editor, Edmonson News (The Gimlet), P.O. Box 69, Brownsville, KY 42210
Ms. Katie Brandenburg, Bowling Green Daily News, 813 College Street, P.O. Box 90012, Bowling Green, Kentucky 42101