

## REPORT SUMMARY

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

Feasibility Scoping Meeting:	2003
Alternative Formulation Briefing:	2003
AFB Guidance Memorandum:	2003
Draft Report Guidance Memorandum:	09 APR 2014
Division Engineer Transmittal:	11 AUG 2014
Received at CECW-PC:	12 AUG 2014
CWRB Briefing:	16 SEP 2014
30-Day S&A Review start:	TBD
30-Day S&A Review end:	TBD
FONSI filed with EPA:	TBD

## STUDY INFORMATION

### Study Authority.

Section 216 of the Flood Control Act of 1970 (P.L. 91-611)

### Study Sponsor.

N/A

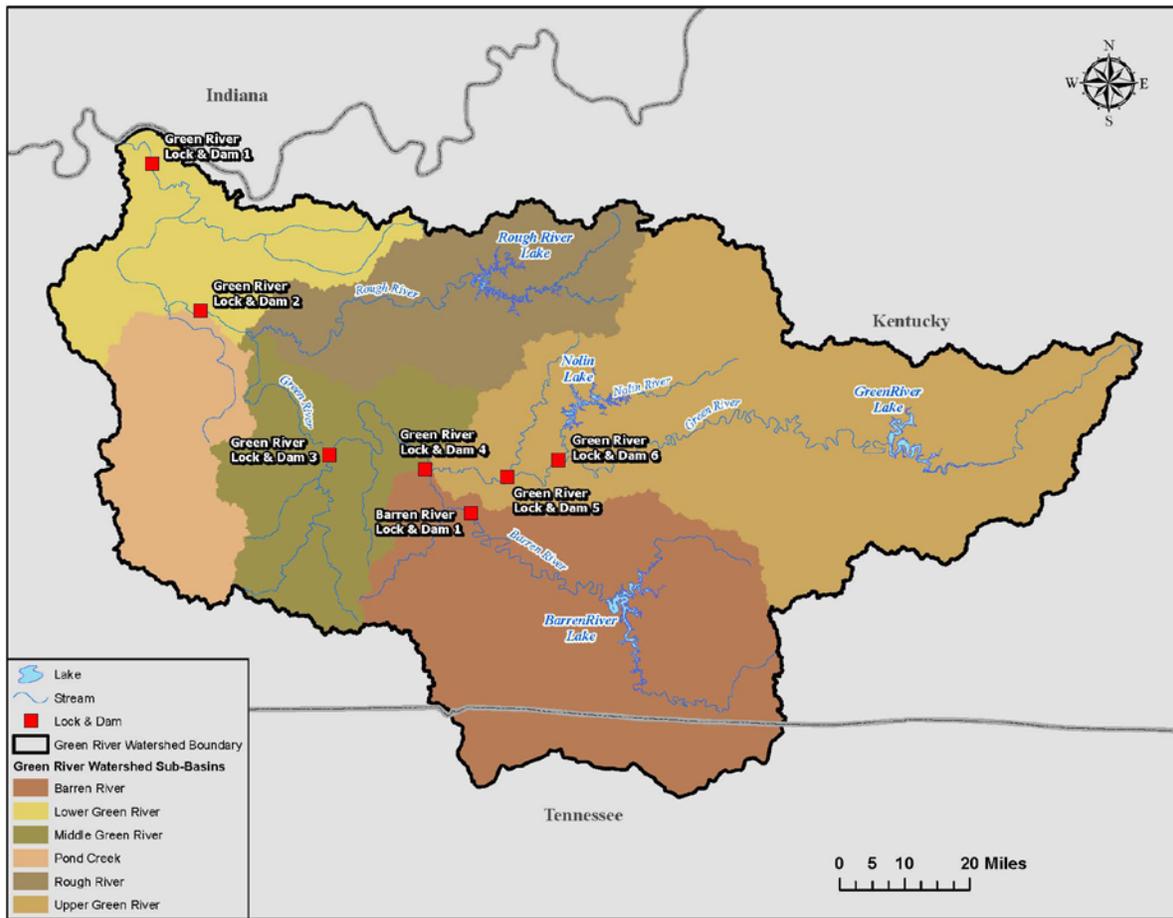
### Study Purpose and Scope.

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.

### Project Location/ Congressional District.

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. The study area lies within the geographic area of the following Congressional Districts: Representative Brett Guthrie (KY2 - R) and Representative Edward Whitfield (KY1 - R).



**Prior Reports and Existing Water Projects.**

- 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 Operation and Maintenance, 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.

### **Federal Interest.**

As the authorized purpose of the projects is commercial navigation and these facilities are no longer serving their authorized purpose, it is in the federal interest to deauthorize the projects.

## STUDY OBJECTIVES

### **Problems and Opportunities.**

The problems that this study seeks to address are as follows:

- 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. The facilities have fallen into disrepair.
- 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.
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The opportunities that this study seeks to take advantage of are:

- 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.
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- Preservation of local transportation routes and local water supplies.

### **Planning 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

### **Planning 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.

## ALTERNATIVES

### Plan Formulation Rationale.

Plans to address the problems and opportunities for deauthorization and future disposition of Green River Locks and Dams 3, 4, 5 and 6 and Barren River Lock and Dam 1 were developed consistent with the planning guidance, and objectives and constraints outlined above. Opportunities for environmental restoration were also carried through to the plan formulation process. Specifically, alternatives were formulated to address safety at each site and to facilitate the eventual transfer of these properties from the Corps. Measures to avoid and minimize such impacts were incorporated into the alternative plans as applicable. This development and screening process led to identifying a set of final alternative plans that were examined in detail. From these plans, the recommended plan was selected for recommendation to Congress for authorization.

### Management Measures and Alternative Plans.

Available methods to stabilize and secure the lock and dam include filling lock chambers with rock, removing dams and installing fencing. A wide variety of measures were considered, some of which were found to be infeasible due to technical, economic, social or environmental constraints. Each measure was assessed and a determination made regarding whether it should be retained in the formulation of alternative plans.

### Final Array of Alternatives

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.

### **Comparison of Alternatives**

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.

### **Key Assumptions.**

Assumptions made during plan formulation include:

- Commercial navigation is no longer feasible in the Upper Green River System.
- There is no longer a federal interest in maintaining these lock and dam facilities.
- There are not life safety issues associated with the failure of any of these facilities.
- There are multiple entities that are interested in assuming ownership of these facilities following deauthorization and disposition.

### **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.

### **Systems / Watershed Context**

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.

### **Environmental Operating Principles.**

The study addresses the USACE Environmental Operating Principles as below:

1. *Foster sustainability as a way of life throughout the organization.* The development of the feasibility report/EA centered environmentally sound plan formulation and design.
2. *Proactively consider environmental consequences of all Corps activities and act accordingly.* This feasibility report/EA includes an analysis of the environmental consequences of the project on all resources within the Green River Basin.
3. *Create mutually supporting economic and environmentally sustainable solutions.* The feasibility report/EA was conducted in a multiagency, regional planning context to ensure deauthorization and disposition recommendations were identified in a manner that achieves a balance between social and environmental stewardship.
4. *Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.* Effective coordination between the project delivery team and the resources agencies, through stakeholder meetings, public meetings and day-to-day correspondence, has ensured that the Corps has met all of its responsibilities under law.
5. *Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.* A systems-based approach that considers all elements of the Green River Basin environment was applied to confirm that effects from project implementation on the environment are beneficial, as the project purpose is ecosystem enhancement and restoration.
6. *Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.* Effective coordination between the project delivery team, basin stakeholders, public meetings and communication with the appropriate partnering agencies ensured that the project benefited from a range of diverse perspectives and ideas.
7. *Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.* This study actively sought out a range of diverse perspectives from diverse stakeholders throughout the planning process. Engagement techniques included public meetings, one-on-one meetings and two public reviews of the feasibility study/EA.

### **Peer Review**

A Review Plan was updated in October 2013. The Type I IEPR Exclusion was approved on 18 December 2013. This documentation will be included in the feasibility study. Agency Technical Review (ATR) of the draft feasibility study was completed on 28 July 2014 and ATR Certification of the final feasibility study was completed on 30 July 2014. District Quality Control Certification was

completed on 16 July 2014. The Legal Review Certification of Legal Review and Policy Compliance Certification were completed on 31 July 2014.

## **EXPECTED PROJECT PERFORMANCE**

**Project Costs.** There are no costs associated with the deauthorization.

### **Equivalent Annual Cost and Benefits.**

A benefit cost ratio was not required for this disposition study.

### **Cost Sharing.**

N/A

### **Project Implementation.**

N/A

### **Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R).**

There are no OMRR&R activities or costs associated with the project.

### **Key Social and Environmental Factors.**

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.

### **Stakeholder Perspectives and Differences.**

Letters supporting the recommended plan came from The Nature Conservancy, several faculty members at Western Kentucky University, Kentucky Waterways Alliance, the Kentucky Department of Fish and Wildlife Resources, the Kentucky Division of Water, and several private individuals. Letters opposing the plan were received from the Judge-Executives of Edmonson, Butler, and Ohio Counties and numerous individuals. Most of these letters expressed the view that the Corps should be restoring commercial navigation to the upper Green and Barren Rivers.

The District received a letter of support from the National Park Service at Mammoth Cave National Park. The U.S. Fish & Wildlife Service had no comments beyond those in earlier coordination which recommended: (a) an examination of sediments behind the dam be made to determine the level of contaminants to determine the best way to remove and dispose of the sediments; (b) removal of the dam gradually and in low-flow periods; and (c) careful development of the final plans for removal of the dam to minimize impacts to fish and wildlife resources. No other Federal agency provided comments.

**Environmental Compliance.**

The Environmental Assessment (EA) is an appendix to the main report and meets the technical requirements for USACE feasibility reports and NEPA compliance. This EA is written pursuant to and complies with ER 200-2-2 (33 CFR Part 230): Environmental Quality - Procedures for Implementing the National Environmental Policy Act (NEPA) and 40 CFR Parts 1500 to 1508 the Council on Environmental Quality (CEQ) Regulations for Implementing the National Environmental Policy Act (NEPA). The public comment period ended in February 2014. The Finding of No Significant Impact (FONSI) will be signed by the Louisville District Engineer and be released with the feasibility report.

**State and Agency Review.** (To be inserted by HQUSACE after the S&A Review ends.)

**Certification of Peer and Legal Review.** Attached.

**Policy Compliance Review.** (To be inserted by HQUSACE when the Documentation of Review Findings are completed.)