

**FINAL SUPPLEMENT I
ENVIRONMENTAL IMPACT STATEMENT
LOWER CUMBERLAND AND TENNESSEE RIVERS
KENTUCKY LOCK ADDITION PROJECT**

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Final
Supplement I Environmental Impact Statement (FSEIS)
Lower Cumberland and Tennessee Rivers

Kentucky Lock Addition

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Abstract: This FSEIS evaluates changes made to the Kentucky Lock Addition project since the original Final EIS (FEIS) was completed in 1992. The 1992 FEIS covered construction of a 110' by 1200' new lock at Kentucky Dam. When the original FEIS was completed, several key design decisions could not be made for some major project features until additional engineering and hydraulic modeling studies were completed. Two major in-stream features evaluated in this FSEIS include the navigation training dike and the spillway training dikes. Other features evaluated in the document cover design changes made to the project based on engineering advances and additional recreational mitigation features that were not specifically detailed in the original FEIS. Two broad plans are considered in the FSEIS. The No Action Plan would be a "fall-back" to the previously approved project as described in the original FEIS (1992) and the subsequent 2000 Highway Bridge Relocation Environmental Assessment. The Proposed Action Plan would be the changes covering several features that are currently recommended based on the recent studies and engineering changes. All of the items listed in the Proposed Action Plan are independent features and could be dropped from consideration without jeopardizing the construction of the new lock chamber itself. The Proposed Plan is a design that provides improved river navigation and reduces many environmental impacts of the earlier design, including incorporating mitigation for unavoidable recreational impacts from the lock construction. Environmental impacts from the proposed plan have been reduced to a level that does not jeopardize significant resources such as endangered species (mussels) or recreational fishing.

Note: The comment period will last for 30 days after the date a Notice is published in the Federal Register by the Environmental Protection Agency. Based on an anticipated published date of May 25, 2001 for the Notice, the comment period will last until June 25, 2001.

Executive Summary

The Corps of Engineers and the Tennessee Valley Authority have prepared this Final Supplemental Environmental Impact Statement (FSEIS) for the Kentucky Lock Addition Project. Members of the public and key resource agencies such as the Kentucky Department of Fish and Wildlife Resources and the U.S. Fish and Wildlife Service participated in this process by attending public meetings and several agency meetings on the scope and development of the proposed features. The Corps of Engineers is the lead agency in the preparation of this document. Resource specialists with TVA provided much of the technical evaluation. Hydraulic engineers with TVA and the Corps' Waterways Experiment Station provided modeling studies and evaluations to support this document.

This document supplements the original Final EIS prepared in 1992. The Supplement evaluates resources affected and environmental consequences for several proposed changes or additions to the previously approved version of the Lock Project. When the original FEIS was completed, several key design decisions could not be made for some major project features until additional engineering and hydraulic modeling studies were completed. Two major in-stream features evaluated in this FSEIS include the navigation training dike and the spillway training dikes. For the spillway training dikes, environmental impacts were evaluated in this FSEIS but funding sources for construction of this feature have not been determined. If it cannot be constructed without increasing the lock construction costs, then other funding sources or authorities would be required for the incremental increase to the lock project. Evaluation of these features required the application of a physical hydraulic model of the lock project that was not available when the original FEIS was completed. Other features evaluated in the FSEIS cover design changes made to the project based on engineering advances and additional recreational mitigation features that were not specifically detailed in the original FEIS.

Two broad plans are considered in the FSEIS. The No Action Plan would be a "fall-back" to the previously approved project as described in the original FEIS (1992) and the subsequent 2000 Highway Bridge Relocation Environmental Assessment. The Proposed Action Plan would be the changes covering several features that are currently recommended based on the recent studies and engineering changes. All of the items listed in the Proposed Action Plan are independent features and could be dropped from consideration without jeopardizing the construction of the new lock chamber itself. The Proposed Plan is a design that provides improved river navigation and reduces many environmental impacts of the earlier design, including incorporating mitigation for unavoidable recreational impacts from the lock construction. Environmental impacts from the plan have been reduced to a level that does not jeopardize significant resources such as endangered species (mussels) or recreational fishing.

Included in the Proposed Action Plan are the following:

- Shifting the new lock upstream about 200 feet and riverward about 20 feet;
- Modification of construction methods to lessen areas within cofferdams and to construct more features in the “wet”;
- New access road to the Vulcan Disposal Area;
- Mitigation for the loss of the TVA Taylor Park Campground (TPC), temporarily closed by TVA in 1997, through construction of a Lock Visitor’s Center, Powerhouse Island Fishing Pier, additional Powerhouse Island restroom and parking, improved coffercell facility for fishermen, and West Bank Fishing Pier;
- Fill Placement in TPC during construction and possibly permanently;
- Mitigation for closure of East bank boat ramp by expanding the west-bank boat basin and constructing a new boat ramp and courtesy dock in the expanded basin;
- Use of the expanded boat basin for contractor activities;
- Refinements in Upstream Lock Features and approach channel;
- Refinements in Downstream Lock Features and approach channel
- Navigation Training Dike off Powerhouse Island to improve commercial navigation conditions;
- Mitigation for west bank river bank closures by construction of downstream fishing jetties and extension of existing boat ramp;
- Spillway Training Dikes to improve recreational boating safety;
- Possible contractor access ramp on Powerhouse Island and east-bank;
- New Lock Access Road to existing lock (fill placement);
- Elimination of upstream and downstream mooring cells;
- Elimination of dredging to widen the downstream navigation channel to the Interstate 24 Bridge;
- Elimination of placement of excavated or dredged material on the east bank from Russell Creek to the Interstate 24 Bridge
- Elimination of aquatic disposal site at Tennessee River Mile 19.9.

Major Conclusions. Major conclusions of this FSEIS are that through the refined design and additional analyses with the hydraulic model, the impacts of the proposed action plan result in only minor and localized impacts on aquatic resources. Two dike structures are proposed to improve river navigation and recreational boater safety. Modeling results have determined that the hydraulic effects of the dikes structures would not negatively alter velocity conditions for downstream mussel beds, which support federally listed species. The spillway training dikes would significantly improve boater safety near the dam. Refinements to the lock design have lessened the degree of in-stream work such as bank excavation and channel dredging as well as eliminating the need for placement of material along about 3000 linear feet of the right bank from Russell Creek to the Interstate 24 Bridge. Construction techniques have been modified to reduce the area that would be dewatered behind cofferdams. Proposed techniques for the lower approach walls call for some features (slurry wall and drilled shafts) to be constructed in the “wet”. Much of the lower guidewall would be constructed on a dry working platform typically five feet above normal water levels. Mitigation for unavoidable construction impacts has

been proposed as described above. Localized construction impacts on tailwater mussel resources would be minimized by relocation of mussels from within the footprint of in-stream structures. Overall, the proposed plan reduces construction impacts of the lock facility itself, while improving long-term recreation facilities for fishermen and tourists. Negative impacts would be temporary and controllable with appropriate best management practices.

Areas of Controversy. Through coordination with various resource agencies throughout development of this FSEIS, most areas of controversy have been resolved. Concerns about negative impacts on high quality mussel resources downstream of the project have been considered and, based on analysis of information developed for the FSEIS, are not anticipated. Concerns about impacts of construction activities on recreational fishing have been considered and mitigated to an acceptable degree with resultant long-term improvements in fishing opportunities following construction.

Unresolved Issues. One issue brought up during the public scoping was the closure of the east bank boat ramp since it is the only facility on the Livingston County side of the tailwater. The east bank ramp is still proposed to be closed, as originally proposed in the 1992 FEIS, due to its location immediately below the navigation channel and problems arising from mixing recreational and commercial traffic. The existing ramp is a former ferry landing and is in poor condition and rarely used by the public. Mitigation proposed for its closure is immediately across the river, requiring a short drive to the Marshall County side. Additional facilities are proposed for the Livingston County side including the new Visitor's Center and Powerhouse Island Facilities.

It should be noted that the narrative description of the west bank fishing jetties has changed in the FSEIS from that of the DSEIS. The FSEIS contains corrected length, area and fill requirements for the jetties (refer to Section 3.10). The new description will be coordinated with the various resource agencies to ensure the degree of impacts, particularly mussel impacts is not unacceptable. Mussel relocation is still proposed for the footprints on the jetties. If the degree of impacts is unacceptable, the design would be modified to reduce the impacts.

Two additional items will be required before a decision can be made on the activities described in this FSEIS. An application for water quality certification is under review by the Kentucky Division of Water. A supplemental Fish and Wildlife Coordination Act Report is being prepared by the U.S. Fish and Wildlife Service, in cooperation with the Kentucky Department of Fish and Wildlife Resources.

FINAL SUPPLEMENT I ENVIRONMENTAL IMPACT STATEMENT

KENTUCKY LOCK ADDITION PROJECT

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1. Notice of Intent to Prepare a DSEIS, Published in the Federal Register on May 12, 2000.
2. Corps Memorandum “Scope of the SEIS” dated February 21, 2000.
3. Corps Memorandum “ Minutes of Agency Scoping Meeting for SEIS” dated May 21, 2000.
4. Corps Memorandum “ Minutes of Public Information Meeting Held May 22, 2000”.
5. Correspondence from the Paducah Area Chamber of Commerce, received May 22, 2000.
6. Joint Public Notice Number 01-15, File Number COE-172, dated February 23, 2001. Kentucky Lock Addition Project, Draft Supplement I Environmental Impact Statement. Section 404 Notice, Request for Section 401 Water Quality Certification and Notice of Availability for DSEIS.
7. DSEIS Transmittal Letter to USEPA, dated February 22, 2001, including Mailing List for Public Notice Number 01-15 and Initial Transmittal List for DSEIS.
8. U.S. Fish and Wildlife Service Letter from Dr. Lee Barkley, dated April 17, 2001, Review of DSEIS.
9. U.S. Environmental Protection Agency, Region 4 Letter from Heinz Mueller, dated April 5, 2001, Review of DSEIS (CEQ #010056).
10. Corps of Engineers Letter from Don Getty to USEPA, dated May 8, 2001 and Memorandum For Record by Tim Higgs dated May 8, 2001. Responses to EPA Review Comments on DSEIS.
11. Kentucky Natural Resources and Environmental Protection Cabinet Letter from Alex Barber, dated April 25, 2001, Coordinated Kentucky State Agencies Review for DSEIS (SERO 2001-14).

Appendix B
Corps and TVA Reports and Evaluations Used in FSEIS (7 Items)

1. Waterways Experiment Station Report, “ Plan C – Spillway Training Works, Kentucky Lock & Dam Model”, by Randy McClollum (11-9-00). Also, Figures Showing Nine Foot Draft Velocity Vectors For Base, Plan B-2 (with Navigation Training Dike) and Plan C (with Spillway Training Dikes). Six Flow Conditions per Plan.
2. TVA Norris Hydrologic Engineering Laboratory, “ Kentucky Lock, Impacts of New Lock on Tailwater Mussel Beds”, by Jerry Schol (12-1-00).
3. Section 404(b)(1) Evaluation, Corps of Engineers, Nashville District, PM-P, by Tim Higgs (5-8-01).
4. Corps of Engineers Letter by Don Getty (dated 11-17-00) and Memorandum For Record, “Temporary Fill for Placement at Taylor Park Campground”, by Benjamin L. Rohrbach, 11 November 2000.
5. Corps of Engineers Memorandum for Record, “ Subject: Water Surface Elevation Impacts Due to Placement of Training Structures In KY Dam Tailwater”, by Benjamin L. Rohrbach, 12 January 2001.
6. Corps Memorandum for Record, “ Subject: Impacts to Headwater and Tailwater Flooding Due to Proposed Features of Lock Addition”, by Benjamin L. Rohrbach, 10 January 2001.
7. Corps of Engineers Letter by Don Getty (dated 9-15-00) and Proposed Compensatory Wetland Mitigation Plan Benton, Kentucky. Also, Kentucky Division of Water Letter from Edward Carroll, dated 10-15-00, acknowledging assurance that mitigation will be completed.

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Chapter 1 - Introduction

1.1 Background. In March 1992, the Corps of Engineers completed a Feasibility Study and Final Environmental Impact Statement (FEIS) titled “Lower Cumberland and Tennessee Rivers Final Feasibility Study Kentucky Lock Addition”. The 1992 report recommended that the existing Federal navigation project for Kentucky Lock and Dam (L&D) at Tennessee River Mile 22.4 be modified to include construction of a second and main lock chamber 110 feet wide and 1200 feet long. At the time this report was completed, it was recognized that additional engineering evaluations and hydraulic modeling studies would be required before some features such as a possible navigation-training dike could be designed. These features were mentioned briefly in the 1992 FEIS, with the need for additional National Environmental Policy Act (NEPA) coverage required by a Supplement to the FEIS when the design of these features had advanced.

In addition to determining the need for a navigation training dike, other changes have been proposed from the original design. This Final Supplemental EIS (FSEIS) will evaluate all the changes that have been proposed for lock features. Overall, these changes would lessen the environmental impacts from that which would have occurred in the original design. A variety of recreational mitigation features have been proposed to mitigate for the loss of a Tennessee Valley Authority (TVA) campground and bank fishing closure during construction. Between the time the 1992 FEIS and this FSEIS was prepared, TVA decided to temporarily close the campground for budgetary reasons.

The Nashville District, Corps of Engineers (Corps) is preparing this FSEIS to evaluate the impacts of changes made to the project which were not addressed by previous NEPA documents. The TVA agreed to be a cooperating agency for this FSEIS with the lead agency being the Corps. Previous NEPA documents include both the 1992 FEIS and the March 2000 Highway Relocation Environmental Assessment. The latter covered the relocation of the segment of the U.S. Highway 62/641 that crosses over the Kentucky L&D to a downstream location.

In accordance with the Council on Environmental Quality (CEQ) regulations, 40 CFR Chapter V Section 1502.21, the following NEPA documents are incorporated by reference and only pertinent information is summarized from these documents to provide an understanding of the current proposed alternatives. Duplication of previous information will be minimized as much as possible. The complete documents are available for review at the Corps offices.

a. Lower Cumberland and Tennessee Rivers Final Feasibility Study, Kentucky Lock Addition, Volume 1, Main Report and Environmental Impact Statement, 13 March 1992. That document will be referred to as the “1992 FEIS” in the remainder of this document. That report evaluated a variety of alternatives to improve river navigation in the lower Tennessee and Cumberland Rivers. The preferred alternative was to construct the 110’ by 1200’ new lock at Kentucky Dam.

b. Environmental Assessment titled “Proposed Relocation of the U.S. Highway 62 and 641 Crossing of the Tennessee River At Kentucky Lock and Dam” dated March 2000. That document will be referred to as the “2000 EA” in the remainder of this document and included a Supplemental Biological Opinion by the USFWS for the entire lock addition project. That document evaluated benefits and impacts resulting from moving the highway crossing off Kentucky Dam to a new location downstream of the dam. No Action involved elevating the crossing over the new lock. The proposed action was to move the crossing to the downstream location, primarily due to the benefits to local traffic patterns. The closure of the highway crossing was substantially reduced from 5 years to about a month with the bridge relocation. The bridge relocation was considered an independent action, not tied to any of the proposed changes evaluated in this FSEIS.

1.2 Authority. Construction of a new lock at Kentucky Dam was authorized by Section 101 A (13) of the Water Resources Development Act (WRDA) of 1996. The Corps published a Notice of Intent to prepare a Draft SEIS on May 12, 2000 for the proposed changes to the Kentucky Lock Addition project. The Corps is obligated to comply with the National Environmental Policy Act (NEPA) (33 CFR Part 230) for this federal action according to CEQ regulations (40 CFR 1500) and Engineer Regulation 200-2-2. The TVA must also comply with NEPA through its implementing procedures and its land use regulations under Section 26A of the TVA Act of 1933.

If one of the proposed features (spillway training dikes) is constructed, additional funding under a separate authority would likely be required. This feature would be constructed as part of the lock project only if it results in cost savings, for example, dike construction in lieu of upland disposal of rock. This feature is being evaluated as part of the FSEIS since it is a reasonably foreseeable future tailwater condition. Potential Corps funding authorities for this feature include but are not limited to the 204 Program (Beneficial Uses of Dredged Material) and the 206 Program (Aquatic Ecosystem Restoration). Both of these programs would require a local cost-sharing partner.

1.3 Purpose of this FSEIS (Decision Required). This FSEIS is being prepared to address changes and refinements to the design of the Lock Addition project that were not covered by previous NEPA documents. 40 CFR 1502.9 states that agencies shall prepare supplements to FEIS if the agency makes substantial changes in the proposed action that are relevant to environmental concerns. At the time the previous documents were prepared, it was recognized that several major design features required additional engineering studies and hydraulic modeling to progress to a point where an informed decision could be made on both the design and any resulting impacts. In addition, several features that were covered in the 1992 FEIS have now been modified due to improved designs and/or construction techniques. Most of the adverse environmental impacts resulting from these improved designs are lessened; however, if these modifications change land requirements or potential impacts, they were addressed in this FSEIS. It is the intent of the Corps and TVA to address all remaining features related to the design of the Lock Addition project in this FSEIS. It should be recognized that contractor proposed changes during construction will have to be evaluated as they are proposed.

Chapter 2 - Agency and Public Scoping and Review of Draft SEIS

2.1 Scoping Process

The Corps of Engineers and the Tennessee Valley Authority (TVA) solicited comments from both the general public and agencies for the scope of the DSEIS. Formal requests for scoping comments were made by publishing a Notice Of Intent in the Federal Register and during agency and public meetings held near Kentucky Dam early in the development of the DSEIS. Complete copies of the various scoping documents and minutes of meetings are included in Appendix A.

2.2 Notice Of Intent (NOI)

The Corps of Engineers published a NOI in the May 12, 2000 Federal Register (Volume 65, Number 93, pages 30573-4) announcing the intent to prepare a Draft SEIS. The Notice also announced that a public meeting would be held on May 22, 2000 to scope for potential issues to be evaluated in the DSEIS. The Notice stated that written comments would be accepted by the Corps of Engineers until June 12, 2000. The Notice provided background information on the purpose of the FSEIS and identified project features and anticipated significant issues to be analyzed in depth including impacts to tailwater mussel resources, tailwater fishing activities, and commercial and recreational boating activities. Schedule for completion of the DSEIS was stated to be February 2001. No responses were received as a result of the publication of this NOI in the Federal Register. A copy of the NOI is included as Item 1 of Appendix A. The TVA agreed to be a Cooperating Agency on the FSEIS. This supplement is necessary to address known proposed changes to the design of the project from that described in previous NEPA documents (1992 FEIS and 2000 EA).

2.3 Agency Scoping Meeting

On May 22, 2000, the Corps held a scoping meeting with several agencies involved in previous coordination on the Kentucky Lock project. The intent of the meeting was to describe the known proposed changes to project features that were being evaluated in the FSEIS and to discuss potential issues or concerns the various agencies would want to see addressed in the FSEIS. Attending the interagency meeting were members of the Corps, TVA, Kentucky Department of Fish and Wildlife Resources (KDFWR) and the U.S. Coast Guard. Unable to attend were the U.S. Fish and Wildlife Service (USFWS) and the Kentucky Division of Water (KDOW), however, previous discussions were made with both agencies. A table was distributed showing how the project had changed from the description in the previous 1992 FEIS and 2000 EA to aid in the discussion. A copy of this table is included as Item 2 of Appendix A. Detailed discussions were held on features that potentially could affect tailwater recreational uses such as the design of fishing facilities, bank closures and boating restrictions during construction, seasonal restrictions on in-stream construction activities and agency preferences on the use of limited mitigation funds. A copy of the minutes of the meeting is included as Item 3 of Appendix A.

2.4 Public Scoping Meeting

A Public Meeting was held on May 22, 2000 at 7 p.m. at the Kentucky Dam Village State Park Conference Center to solicit input from the general public on issues related to the Lock Addition project. Minutes from the meeting are included in Appendix A. Approximately 100 citizens attended the meeting. The meeting began with a General Session with opening remarks made by:

- Corps of Engineers - LTC Peter F. Taylor, Jr., District Engineer, Nashville District
- Tennessee Valley Authority – Gary Brock, Manager, Navigation and Structures Engineering
- Kentucky Department of Fish & Wildlife Resources – Ted Crowell, Assistant Director of Fisheries

An overview of the project was then provided by the Corps of Engineers, including computer animations of some proposed features. A powerpoint of this presentation is included on the KY Lock website (<http://www.orn.usace.army.mil/pao/kylock/default.htm>).

After the General Session, two Breakout Sessions were held: “Tailwater Fishing” and “All-other Project Features”. The purpose of these breakout sessions was to solicit ideas/comments/questions from the attendees. A summary of the input collected at these breakout sessions is provided in the minutes of the meeting which are included as Item 4 of Appendix A.

“Tailwater Fishing” Breakout Session. Drawings of several proposed features were distributed to the attendees. A tailwater fishing survey was also distributed during the breakouts to solicit preferences on the design of several fishing features. The input received was used to determine which features would be considered and to guide the design of the tailwater fishing features developed as part of this FSEIS. Items discussed included existing and future boats ramps, fishing piers, fishing jetties, modifications to the powerhouse island coffer cell, and possible construction of parking and restroom facilities. For several items, there was considerable debate on the preferred design. The reader is referred to the minutes of the meeting for detailed discussion. Generalized preferences were as follows:

- Livingston County Executive requested providing an east bank boat ramp;
- Upgrade the existing west bank ramp to improve low water use;
- Do not raise the Powerhouse Island coffer cell elevation but improve railing;
- Expansion of west bank boat basin is desirable, location of the courtesy dock within the basin was debated;
- West bank fishing jetties were desirable to provide (mitigate) bank fishing impacts;
- For the two fishing piers, provide different elevations for fishing platforms.
- Provide markings for submerged coffer cells to improve boater safety.
- New Powerhouse Island Restroom should be open 24 hours a day;

“All-Others Project Features” Breakout Session. This session discussed items related to issues potentially affecting local area businesses and residents during and after construction. Items discussed included construction and post-construction traffic patterns, number of construction workers, employee parking, public visitation during construction, design of the new Lock Visitors Center, linkage of Lock facilities to Paducah’s River Heritage Museum, and labor relations (lessons learned from Olmsted Project), and cost sharing of mitigation features (use of navigation trust funds). The Paducah Area Chamber of Commerce provided a written position statement supporting the project, a copy is provided as Item 5 of Appendix A. Some items discussed are not part of the current FSEIS scope since they were previously addressed during the 2000 EA.

After the breakout sessions, a Close-out Summary Session was provided to summarize issues and comments from each break-out. No additional written comments were received after the public meeting.

2.5 Major Themes Resulting from Public and Agency Scoping. Several key themes were emphasized during the scoping process and throughout the preparation of the FSEIS. These are briefly summarized as follows:

- Tailwater fishing and other recreation uses are critical to the local economy. Efforts should be made to minimize impacts during and after construction;
- The Tennessee River below Kentucky Dam contains both a high quality fishery and a unique assemblage of freshwater mussels and gastropods (including federal threatened and endangered species). Protection of this resource is of utmost importance.
- Impacts to the economy of the local area should be considered, including traffic and construction worker effects. Long-term effects of the improved lock facilities are beneficial for industries utilizing river navigation.

2.6 Issues to be Considered in Detail. Coordination with the various agencies and public have identified the following issues that will be considered in detail in this FSEIS:

Recreation – Tailwater fishing is highly utilized. Recreational fishing use of the tailwater rivals that of the Kentucky portion of Kentucky Lake. Other recreational uses at the Kentucky Dam area include tourists viewing the lake and dam, wildlife viewing, camping at the State Park, and linkage to regional recreational attractions such as Land-Between-The-Lakes.

Tennessee River Mussels and Gastropods. The lower Tennessee River is designated as an Outstanding Resource Water by Kentucky due to the unique assemblage of freshwater mussels and gastropods. This includes mussel species federally listed as threatened and endangered. It is extremely important that conditions currently present in the tailwater be maintained during and after construction of the lock facilities and any related features.

Socioeconomic Effects. Construction of the new lock will aid the economy that utilizes river navigation. In addition, the lock and dam facilities are intimately tied to the economy of the local area through the benefits generated by recreational uses.

2.7 Agency and Public Comments on DSEIS. The DSEIS was transmitted to EPA on February 22, 2001. The EPA published a Notice of Availability for the DSEIS (EIS No. 010056) pursuant to 40 CFR 1506.9 in the March 2, 2001 Federal Register. The DSEIS was available for review and comment for the required 45-day period (through April 16, 2001). The Corps simultaneously transmitted the DSEIS to known interested parties and agencies at the same time it was filed with EPA. The Corps also issued Public Notice (PN) No. 01-15, File No. COE-172 on February 23, 2001 with a comment period running concurrently with the Federal Register NOA. This PN announced the availability of the DSEIS for review and provided notice pursuant to Section 404 of the Clean Water Act. The PN also requested modification of the existing water quality certification pursuant to Section 401 of the CWA. A copy of the PN is included in Appendix A (Item 6). A copy of the transmittal letter to EPA including the mailing list for the PN and the initial DSEIS transmittal list are included in Item 7 of Appendix A.

The USFWS, EPA Region 4, and the Commonwealth of Kentucky Natural Resources and Environmental Protection Cabinet submitted review letters for the DSEIS and/or PN. Copies of their letters are included in Appendix A (Items 8-9, 11). Two public requests for a copy of the DSEIS were made, however, no public comments were received during the review period.

The USFWS letter (Item 8) concurred with the determination made by the Corps and TVA on compliance with Section 7 of the Endangered Species Act. The USFWS agreed the previously issued Biological Opinion was adequate to address the features covered by this FSEIS. As such, the requirements of Section 7 of the ESA have been fulfilled. They also requested clarification in the FSEIS on the status of wetland mitigation. The DSEIS (Section 6.3) stated that mitigation has been accomplished. More correct statements have been made in the FSEIS saying that a mitigation site has been selected and a mitigation plan developed (copy in Appendix B, Item 7). The mitigation work will be on-going until monitoring documents that the site has been successfully restored. The USFWS also stated that the supplemental Fish and Wildlife Coordination Act report is being prepared and would be transmitted to the Corps at a later date. This is required before a Record of Decision can be signed.

The EPA, Region 4 review letter (Item 9) contained several comments about the DSEIS and assigned a rating of EC-2. They still have some environmental concerns regarding potential loss of mussels resulting from construction activities and subsequent losses resulting from indirect causes attendant to operating a new lock. In general, they requested additional clarification on the description of existing resources (mussels, wetlands, archeological sites, and wildlife habitat) and the projected affects on these resources resulting from the Kentucky Lock Addition project. On May 8, 2001 the Corps and TVA transmitted to EPA a response letter and memorandum (refer to Appendix A , Item 10). An error was noted in one response (in paragraph 5 of the memorandum) and a

corrected response was subsequently transmitted to EPA (and other resource agencies). The Corps and TVA have revised the FSEIS to reflect the responses to EPA comments.

The Commonwealth of Kentucky Natural Resources and Environmental Protection Cabinet submitted a coordinated review for Kentucky State Agencies by a letter dated April 25, 2001 (Appendix A, Item 11). Most state agencies provided a No Comment response, including the Department of Fish and Wildlife Resources and Department of Parks which have been closely coordinated with throughout the development of the FSEIS. The Division of Waste Management provided three comments that would be implemented throughout the project. The Division of Water (DOW) stated that 401 water quality certification is required and acknowledged the application is under review. Additional information requested by phone has been submitted to the DOW to aid the water quality certification review (stream relocation details). The DOW stated that the downstream location of the mussel sanctuary was at Tennessee River Mile 21.2. Note this sanctuary spans from Tennessee River Mile 17.8 to Kentucky Dam at Mile 22.4. The DOW commented that the FSEIS needs to outline Best Management Practices (BMPs) to be used and mentioned two agencies and a BMP Manual as resources to assist with development of BMPs. Some additional language has been added to the FSEIS to address BMPs to be used. The Corps notes that it has obtained coverage under the KPDES general permit for storm water point sources and all contractors are to submit detailed Storm Water Best Management Practices Plans outlying compliance with the general permit.

Chapter 3 - Alternatives Being Considered (Project Description)

For the purposes of this FSEIS, two broad plans are being considered: (A) No Action and (B) Proposed Action or Preferred Plan. For each feature, both the No Action (previously approved version) and the Proposed Action will be discussed. A decision will be made on each individual feature of the proposed plan, not necessarily the whole package since each of these are independent of the others. Figure 1 shows an aerial view of the existing lock, Powerhouse Island, proposed Vulcan disposal area, and much of the tailwater vicinity.

A. The No Action plan is implementing the project as previously approved in either the 1992 FEIS or the 2000 EA. By “No Action”, we mean reverting back to the previously approved feature, not deciding on whether to construct a new lock.

B. The Proposed Plan is the currently recommended design for each lock feature based on recent engineering studies, hydraulic modeling information, or the item is a newly added feature that was not considered in earlier NEPA documents. Figure 2 is a general site plan showing the location of features requiring in-stream or floodplain fill. This figure identifies most features being evaluated in the FSEIS, with the exception of some public parking areas and public restroom facilities.

Since this FSEIS refers to several independent features, the No Action and Proposed Action description follows for each individual feature. This allows an easier comparison to be made by the reader for each feature. The Proposed Action plan is the suite of changes currently recommended based on recent modeling studies and engineering changes. All of the items listed in the Proposed Action plan are independent features and individual items could be dropped from consideration without jeopardizing the construction of the new lock or other independent features.

Description of Individual Features

3.1 Access Road to Vulcan Disposal Area (VDA).

A. **No Action.** In the 1992 FEIS, the VDA was identified as a disposal area, however, no specific access road routes were identified. It was assumed that access roads would be covered in the future NEPA documents. The 2000 EA did identify the lower haul route, but detailed design of the cut/fill requirements and corresponding floodplain impacts were not finalized at that time. Preliminary wetland impacts were conservatively over-estimated in the 2000 EA.

B. **Proposed Action.** The proposed plan for accessing the VDA is to provide access both via public roads and a dedicated “project-use only” direct access from the main lock construction area. This direct route would allow construction traffic to be segregated from public traffic for the bulk of the lock excavation. The route of the access road is shown on Figure 3 and does require some floodplain and wetland fill and stream relocation. Complete plans are available at the Corps offices, including cross-sections of

the road. Plans call for utilizing the route of the existing east bank tailwater road and the road to the parking lot for the TVA Saunders Archeological Site. From this point, the existing paved path (formerly a gravel road) from the parking lot to the VDA would be widened. From the parking area for the archeological site to the VDA, this route is currently part of the Livingston County Trail system. The existing paved trail would be widened and graveled from an existing width of 14 feet to 44 feet to allow two-way haul truck traffic to access the VDA site. The crossing of Russell Creek, immediately below a small pond, would require upgrading to accommodate truck traffic. Immediately past this crossing, the route would turn 90 degrees east and follow a route between a small tributary stream and the base of the dike for the pond. A 285-foot section of the Russell Creek tributary, which shows as a blue-line stream on the USGS quadrangle, would have to be relocated to allow for the road widening. After reviewing the information in the Draft SEIS, the Kentucky Division of Water requested modifications to the stream relocation channel design. This new design has been submitted to their office and is shown on Figure 4 (replacing Figure 4 of the DSEIS). Detailed drawings of the channel relocation (plan view), rock check structures, planting procedure notes, and two channel cross-sections are included on the modified Figure 4. After passing the east end of the dike, the haul road route would follow an existing gravel road to the VDA.

Minor wetland impacts would occur in an area along the base of the pond dike and at the widened Russell Creek crossing. In development of the 2000 EA, a conservative estimate of the potential wetland impacts (0.25 acres) associated with the construction of the VDA haul road was used for planning mitigation sites. A description of the wetland quality and functions was also provided in the 2000 EA. Due to the small potential area affected by the haul road construction and the desire to develop a mitigation site to address all wetland impacts associated with the Kentucky Lock Addition project, it was decided to include mitigation for the haul road impacts within the overall project mitigation site. The Kentucky Division of Water agreed with this approach. Since the time of the 2000 EA, the design of the haul road has been completed. The actual wetland impacts from the VDA Haul Road construction is 0.11 acres of emergent wetlands.

The 2000 EA mentioned 7 acres of wetland impacts, of which 6.75 acres were associated with the construction of railroad and highway embankments on the west bank (of the Tennessee River). Mitigation requirements were set at 14 acres (2:1 ratio). The approved mitigation site purchased earlier this year by TVA includes additional wetland acreage above the minimum requirement. The mitigation site has 15.1 acres of prior-converted wetlands (potential mitigation) and also includes 9 acres of existing wetlands. The site is near Benton, Kentucky and adjoins the Clarks River National Wildlife Refuge (NWR), a U.S. Fish and Wildlife Service facility. TVA intends to incorporate it into the larger refuge in the future, after approval by the Clarks River NWR. Construction plan and specifications (90% completion level) are available upon request. The VDA Haul Road wetland impact (now 0.11 acres) was included (mitigated for) in the approved wetland mitigation site. In the development of the 2000 EA, the USFWS recommended the fill at the Russell Creek crossing be removed after completion of the disposal activities. This would be done by the contractor doing final restoration of the VDA Haul Road.

In the design of the haul road, the road was widened toward the hillside where practical. Fill placement toward the floodplain of Russell Creek was used where a wide hill cut or expensive retainment structure would be required to provide a stable slope. With the exception of the Russell Creek crossing, this fill placement is in upland areas, although some fill placement (27,500 cubic yards) was required in the 100-year floodplain (below elevation 346.6'). This road widening would disturb a strip of wooded (4.5 acres) and meadow (1.5 acres) areas adjacent to the existing paved path. The paved path would be restored to its original use as a Livingston County trail after the project is completed. The entire 43 acre disposal area would be re-vegetated with species to promote its use as wildlife habitat.

3.2 Taylor Park Campground (TPC). TVA's TPC is located on the right-bank immediately upstream of Kentucky Lock. The campground has a capacity of 42 campsites on a 15.5 acre site, including some lake frontage. The campground was open year-round until it was temporarily closed at the end of the 1997 tourist season because of a lack of funding for maintenance.

A. **No Action.** In the 1992 FEIS, TPC was proposed for use during construction for activities such as equipment storage and contractor staging. In the 1992 FEIS (see p. EIS-54, 4.55), it was recognized that the loss of this campground would have to be mitigated. The mitigation planned was to develop the same number of campsites at an undetermined location on Kentucky Lake. An estimated cost of \$1.5M for this campground relocation was included in the authorized project cost estimate. Part of the existing campground facilities, specifically, the restrooms and a small picnic ground, were to be reopened after project construction.

B. **Proposed Action (Taylor Park Campground Mitigation).** The existing TPC site would still be used for construction purposes such as storage and staging, with fill placement, as described later to raise the ground elevation. Since the completion of the 1992 FEIS, TVA has decided to permanently close the TPC since adequate campground facilities exist in the vicinity of the TVA reservation. The funds that would have been spent on relocating the campground (\$1.5 million) would be spent on other recreational facilities in the immediate area. Based on current recreational needs and TVA funding priorities, it is now TVA's position that replacement campsites are not the preferred mitigation plan. TVA now feels that enhancing the fishing opportunities in the Kentucky Dam tailwater and the construction of a visitor center at Kentucky Lock would be better suited as mitigation features for the loss of TPC. Current mitigation plans call for the following features to be constructed, subject to funding restraints (for location refer to Figure 2):

- Construct a new lock visitors center;
- Construct a fishing pier on the west side of the Powerhouse Island;
- Construct additional parking and restroom facilities on the Powerhouse Island;
- Improve railing on existing coffer cell for fishing use;
- Construct a fishing pier on the west bank of the Tennessee River.

New lock visitor center. As requested by the affected resource agency (TVA), the Corps has investigated alternative lock visitor center locations/configurations as partial mitigation for the closure of TPC. The visitor center is proposed to be a facility incorporated into the new lock operations building that would be located just east of the new lock's landwall and near its upstream/downstream centerline. The entire building would be about 13,500 ft² in size, with the Visitor Center portion being 2,663 ft². TVA has agreed to take ownership of the building with attendant operation and maintenance responsibilities. The maximum proposed budget for the Visitor's Center from Corps of Engineer funds is \$400,000 for construction and \$100,000 for exhibits.

Powerhouse Island Fishing Pier. Figure 5 shows a general plan and elevation view for the Powerhouse Island Fishing Pier. The pier would consist of a 90-foot span extending perpendicular from the bank at elevation 328'. A second span angled downstream would extend 90 feet to the terminal pier and fishing platform that is under the centerline of the future U.S. Highway 62/641 Bridge. The fishing pier and connecting land ramp would gradually slope downward as shown on the profile view and would be American's With Disabilities Act (ADA) compliant. The terminal platform elevation was selected to compromise the times of inundation and fishing accessibility. With an end elevation of 318', the terminal platform would be underwater 62 days in a typical year. As shown in Figure 2 (as Item 17), the pier would be located in the area of powerhouse discharges and be subject to high velocities. The terminal support pier would utilize a "techniques shaft" that is being built as part of the highway bridge construction, so this reduces the additional cost of the fishing pier. One additional 6-foot diameter support pier would be constructed near shore.

Powerhouse Island Parking and Restroom Facilities. In order to provide more public parking for fisherman use and other recreational visitors, an additional 33 parking spaces would be provided on the lower end of the powerhouse island (see Figure 6). A new restroom facility is also proposed for the Powerhouse Island to provide a facility more accessible to fishermen (see Figure 6).

Improve Railing on Existing Coffer Cell. An enhanced railing for the coffer cell (Figure 6) has been proposed to improve safety for fishermen using this facility for fishing access. Shad dippers (fishermen who dipnet shad for bait) use this coffer cell as a working platform. A more durable railing system has been proposed that should be able to withstand frequent inundation and high water velocities. The elevation of the existing coffer cell is 302.8' and will not be significantly altered (9" concrete cap may be added).

West Bank Fishing Pier. A fishing pier has also been proposed for the west bank of the Tennessee River and would be located beneath the relocated highway bridge. The location is shown on Figure 2 (Item 18). Figure 7 shows a general plan and elevation view of this pier. It would be ADA compliant and have a lower terminal fishing platform than the Powerhouse Island fishing pier. The fishing pier would be connected to both steps and an ADA accessible land ramp. The terminal fishing platform would be at elevation 310' and utilize the technique shaft of the highway bridge for the support pier

so this reduces the additional cost of the fishing pier. One additional 6-foot diameter support pier would be constructed near shore. The platform elevation was selected based on discussions with both TVA, KDFWR and the public to allow improved fishing at lower river levels. At this lower elevation, the terminal platform would be inundated more often (110 days in a typical year) than the fishing pier proposed for the Powerhouse Island, however, water velocities are lower on the west bank. This pier would be closed more often due to the high water levels and associated clean up.

3.3 Use of the TPC Area During Construction.

A. No Action. The TPC was proposed for use, without modification, as a contractor staging area and equipment storage during construction of the new lock.

B. Proposed Action (Fill Placement in the Lower Level of TPC). The TPC is still proposed for use as contractor staging and equipment storage during lock construction. Because the lower level of the TPC (10.8 acres) is subject to frequent flooding, it is now proposed that fill be placed up to an elevation of 385' in this area. The existing ground elevations in the lower level range from 355' near water's edge to 365' at a point farthest from the lake. The upper level of the TPC (1.9 acres) is nearly flat at 385'. Figure 8 shows a plan view of the disposal area at maximum fill placement. Fill would not be placed below the ordinary summer pool level (359') of Kentucky Lake with the toe of the fill slope at an elevation of 365'. The maximum flood control pool for Kentucky Lake is 375'. Since fill would be placed within the maximum pool level, flood storage between 359' and 375' would be affected by this fill placement and this impact is evaluated elsewhere in this FSEIS. An estimated disposal area capacity is 200,000 cubic yards, including fill placed between elevation 375' and 385', above the floodplain. Most of the fill would probably be removed from the area to be used as lock backfill later in construction (likely after 2007). The ultimate configuration of the lower level would be dictated by TVA needs/plans for this area after project completion. Current post-construction plans for the TPC area is for a public day use/picnic area.

3.4 Mitigation For Closure of East Bank Tailwater Boat Ramp. The east bank tailwater boat ramp is located at the end of the Ferry Landing Road in Livingston County. Because this is the only launching facility on the Livingston County side of the river, the Livingston County Judge Executive requested this ramp be upgraded or replaced within Livingston County. However, since this ramp is immediately below the lock approach channel, this location presents potential safety concerns due to mixing of recreational and commercial river traffic. The existing ramp is a former ferry landing with little parking area and is currently in poor condition and rarely used by the public. Alternate sites on the east bank would present both navigation concerns and environmental concerns (mussel impacts), therefore, detailed consideration of Livingston County sites was not further pursued.

A. No Action. In the 1992 FEIS, this ramp was proposed to be permanently closed and, as mitigation, the existing west-bank ramp area was to be upgraded to handle

additional capacity. In addition, a new restroom facility was to be built and the existing gravel parking area was to be paved at the existing west-bank ramp.

B. Proposed Action. The east bank ramp is still proposed to be permanently closed due to safety concerns. Instead of upgrading the existing west bank ramp, it is now proposed that the existing west bank boat basin be expanded and a new boat ramp and floating courtesy dock be ultimately located within the expanded boat basin. This location is shown as Item 2 on Figure 2. The reasons for the expanded boat basin are two-fold: (1) to provide a suitable in-water location for bridge and lock contractors to access the shore and (2) to provide long-term recreational facilities (ramp and courtesy dock) after the project is constructed. The basin is being designed to accommodate construction of the railroad truss structure to be placed over the navigation channel. Figures 9 and 10 show a plan view of the existing and expanded boat basin. The proposed bottom grade for the expanded basin is 293'. Much of the existing basin would have to be dredged to reach this grade. An estimated 139,000 cubic yards of material would be excavated to expand the existing basin to roughly 400' (distance into shore) by 527' (bank length). Most of the excavated material would be placed in the west-bank disposal area. Some limited demolition debris would require disposal either in the VDA or another approved demolition landfill. The expanded basin would be lined with riprap to stabilize the banks. The new public boat ramp and dock would not be constructed until contractor activity ceases in the basin to prevent possible damage by construction. New restroom facilities and paving of the parking area are proposed in the area adjacent to the expanded basin.

3.5 Contractor Bank Access During Construction.

A. No Action. Contractor bank access for work barges during construction was not included in the original EIS.

B. Proposed Action. Based on the degree of work involved with the construction of the new lock and the relocated railroad and highway bridges, a dedicated contractor access location needed to be evaluated as part of this FSEIS. Three alternatives were discussed with pertinent agencies and during the public scoping meeting. These alternatives were: 1) expanded west bank boat basin; 2) new contractor west bank ramp upstream of the boat basin; and 3) use of the east bank boat ramp. Two additional access locations have since been added and are described later (Section 3.13 and 3.14). Based on the preliminary discussion and the comments received during the public meeting, the expanded west bank boat basin was selected as the proposed contractor primary access facility. This was based on the long-term recreational benefits of providing the expanded basin after construction and the relatively low level of environmental impacts anticipated with expanding the basin.

A key consideration for proposing the expanded basin was the need for a contractor work area and access ramp in an area not subject to high water velocities. This area would be used during construction of the new railroad bridge trusses for the navigation channel. A float-in truss operation is proposed where the truss would be erected in the basin on

temporary piers and then mounted on work barges and floated into place on the new bridge piers. The expanded west bank boat basin was designed to accommodate the proposed use by the bridge contractors. The Kentucky Dam Village State Park would own the new facilities, except for the restrooms, which TVA would own. The new boat ramp and dock would not be constructed until the end of the lock project (after 2007), then would be available for public use thereafter. During lock construction, the existing west bank boat ramp would still be available for public use.

3.6 Upstream Lock Features (Approach Walls, Channel Excavation).

A. No Action. In the 1992 FEIS, the upstream guidewall was to consist of 20 cellular structures of 36' diameter. Figure 11 (originally, Figure 2 of the 1992 FEIS) shows the location of the new lock features, including the guidewall. This design permanently covers about 20,000 square feet of lake bottom with the lock wall. No specific discussion of the upstream approach channel excavation was provided in the 1992 FEIS, however, more channel excavation would have been necessary with the original lock alignment. Under the No Action plan, the lock was farther from the existing lock.

B. Proposed Action. The upstream approach walls are now proposed to be floating structures with drilled shaft connections at the upstream end of both the guidewall and guardwall. Figure 12 shows the plan view of the upstream approach walls and bottom excavation/dredging required to construct the new upstream lock features and channel approach. The length of the guidewall and guardwall is unchanged from the 1992 FEIS at 675' and 125', respectively. Three drilled shafts would be located at the end of each wall and each shaft would be 10' in diameter. Relative to previous designs, the area of bottom permanently covered by these structures would be greatly reduced to less than 500 square feet.

The existing lake bottom would be excavated to elevation 332' beneath the guidewall and this excavation would be daylighted out toward the navigation channel for the length of the wall. Dredging has been proposed for the upstream approach channel to the new lock. The navigation channel upstream of the end of the guidewall would be excavated to 340'. Much of the existing bottom is already below 340' and would not require dredging. The area shown landward of the proposed guidewall is to be dredged to elevation 345' to allow for mooring of the work barge for lock maintenance (800' strip behind the wall) and for access to Taylor Park Campground for off-loading materials. The total dredging/excavation volume is 188,000 cubic yards from an area of 8.23 acres (shown on Figure 12). This material would be disposed of in an upland area, likely the Vulcan Disposal Area (VDA), unless the material is rock that can be utilized elsewhere in the project (see spillway training dike discussion). The only exception to VDA disposal of wet material is that some minor dredging associated with the cofferdam installation would go to the TPC fill area.

3.7. Downstream Lock Features (Cofferdam, Approach Walls and Approach Channel).

A. No Action. The No Action plan shows substantial disturbance of in-river areas for the construction of downstream facilities such as the cofferdam and approach walls. The original plan called for a very large area to be dewatered behind the cofferdam. Figure 11 shows the area affected by these facilities. In the 1992 FEIS, the downstream approach guidewall and guardwall were to be constructed in the dry by using a long cofferdam that encompassed both the approach walls. The bulk of the approximately 2,240,000 CY of excavation for the lock chamber, guardwall, guidewall, and right-bank reshaping would be in the dry behind the lower cofferdam. The right-bank and approach channel would be excavated for approximately 1500' from the end of the guidewall to the mouth of Russell Creek. Additional dredging of about 59,400 CY of material would occur to widen the right margin of the navigation channel down to the I-24 Bridge. A portion of the material excavated from the river was to be disposed of at an aquatic disposal area on the right-bank at TRM 19.7 (see Figure 3 of 1992 FEIS). Other stone excavated was to be used to riprap the right-bank from the mouth of Russell Creek to the Interstate 24 Bridge (3000 linear feet). The bank stabilization would have been accomplished by hauling material from the lock pit to the bank area via trucks over a haul road that would have crossed Russell Creek near its mouth.

B. Proposed Action. These features have undergone major modification from the design envisioned in the 1992 FEIS. Figure 13 shows the proposed downstream lock features and proposed channel elevations. Figure 14 shows typical cross-sections through the guidewall. Note that a trench is to be excavated to elevation 287' and extend 37 feet out from the guidewall. The remainder of the navigation channel would be 289', however, most of the existing channel is already at or below this grade and only very limited excavation would be required outside of the trench adjacent to the guidewall. The proposed cofferdam has now been shortened by over 1000'. The downstream guidewall and guardwall would be built in the wet using drilled shafts and roller-compacted concrete.

The extensive right-bank excavation and dredging for the downstream approach channel would not be necessary based on the recent design modifications. By moving the proposed lock chamber upstream about 200 feet and riverward about 20 feet, much of the previously envisioned bank and channel excavation was eliminated. Modeling at the Corps' Waterways Experiment Station (WES) confirmed that extensive excavation would not be required.

For the construction of the downstream cofferdam, some limited channel and bank excavation would be required. Temporary fill placement, an estimated volume of 1900 CY, would be needed in order to form part of the guidewall. This fill would occur in places along a 450-foot length from Station 23+50 to the downstream end of the guidewall. The fill would consist of granular fill with little to no fines and would be lined with riprap. The purpose of the fill is to develop a working platform at elevation 307' for

channel excavating equipment and to help form the slurry wall. The fill and protecting riprap would be removed following completion of the channel excavation and drilled shaft/diaphragm wall foundation cap. Two temporary guardcells for the cofferdam would also require some wet excavation.

Some limited channel excavation would occur to allow adequate draft for the float-in of the railroad bridge truss (Item 4 on Figure 2). A detailed excavation plan for the float-in activity is shown on Figure 15. The excavation on the east side (right-descending bank) would be done as part of the guidewall and navigation channel work described in the previous paragraph. An additional excavation volume of 100 CY is required for the railroad truss float-in in the small area on the west side of the navigation channel.

In general, these proposed design modifications have considerably lessened the degree of in-stream activity required to construct the downstream lock features. The downstream aquatic disposal area at TRM 19.7 and 3000 linear feet of bank stabilization have been dropped from the project because of the reduced volume requiring disposal after reorientation of the lock chamber. Upland disposal is proposed for all excavated material unless the material is suitable for and used to construct the spillway training dikes. The right-bank excavation downstream of the guidewall has also been eliminated. The major change affecting environmental considerations is the elimination of dredging to widen the navigation channel downstream of the new lock guidewall to the Interstate 24 Bridge.

3.8. Navigation Training Dike. The purpose of this structure is to improve navigation conditions for up-bound river traffic entering the lock approach channel by reducing the eddy that forms downstream and to the east of the Powerhouse Island. The Kentucky Lock Navigation Model was used to evaluate size and configurations of different structures on commercial navigation and river velocities and flow patterns. One structure evaluated was a navigation training dike. Figures 16 and 17 illustrate the model predicted velocities at the nine foot depth under current and Plan B-2 (with navigation training dike). Under the existing (base) condition the eddy often pushes the stern of upbound traffic towards the Powerhouse Island.

A. **No Action.** In the 1992 FEIS, the possible need for a navigation training dike was recognized. However, it was also recognized there may be potential impacts of such a structure on downstream mussel beds and that the hydraulic modeling information required to properly design and evaluate the structure was not available. Therefore, the decision of adding this feature was delayed until the current SEIS was being prepared.

B. **Proposed Action.** Based on the physical modeling studies performed at WES over the last couple of years, a proposed design for a navigation training dike has now been developed. The location of the navigation training dike is shown as item 6 on Figure 2. Figure 18 shows the plan, profile, and cross section views of the proposed structure. WES developed the final configuration for the navigation training dike (Plan B-2). Various alternative structures were evaluated under a variety of flow and tailwater conditions. This structure has been reduced in size from what was originally envisioned prior to modeling studies. Based on these modeling evaluations, the reduced structure is

still effective in addressing the eddy formation and strength. The length of the structure is 188' and its width would vary from 63' at the end to 80' where it attaches to the shore. The dike would be tiered-down from an elevation of 316' at the bank to 284' at the end. It has been requested by KDFWR that the crest be textured and leveled so bank fishermen could safely utilize the dike during low water periods. The dike has been designed with a 10-foot crest width. Signage or buoys would be provided to alert boaters of the presence of the navigation training dike.

3.9 Upstream and Downstream Navigation Mooring Cells and/or Buoys.

A. No Action. In the 1992 FEIS, two new downstream mooring cells, just upstream of the Interstate 24 Bridge, were proposed to replace the mooring cells just downstream of the Powerhouse Island. Two new upstream mooring cells were also proposed in Kentucky Lake. The two existing mooring cells immediately below the tip of the Powerhouse Island were proposed to be removed (See Item 11 on Figure 2).

B. Proposed Action. No new navigation cells or buoys are now being proposed for either upstream or downstream of Kentucky Dam as part of this Lock Addition project. Some preliminary consideration was given to providing two temporary navigation buoys at TRM 19.4 (Left Bank) and 20.6 (Left Bank) to be used only during construction of the new lock or during times of lock outages. The buoys would not be needed after the new lock was operational since the traffic congestion would be eliminated or drastically reduced. It was recognized that finding a site for new downstream navigation buoys would be difficult due to endangered species considerations, therefore, they have now been dropped from the project. The two existing mooring cells (Item 11 of Figure 2) are still being removed as previously planned. All gravel fill material would be disposed of in an upland location.

3.10 Mitigation for Closure of the West Bank to Fishermen.

A. No Action. This was not addressed in the 1992 FEIS even though construction of the railroad bridge would have required some west-bank closures. During the development of the 2000 EA, it was recognized that mitigation for bank closures would be needed due to the additional bridge relocation construction activity.

B. Proposed Action. As mitigation for the closure of the west-bank to fishing during construction of the relocated bridges and the new lock, additional bank fishing access and improvements to the existing west bank boat ramp have been proposed. West bank fishing would be limited for a period of 3-4 years in and upstream from the existing boat basin (about 3700 feet). Walking access would be allowed along the west bank until the bridge construction is active (anticipated in the Fall of 2001). The existing west bank boat ramp has been proposed for upgrading by adding an additional lower section to avoid its current sharp drop-off. This upgrade would require a short closure of the ramp to add another ramp section and this work is proposed to be done early in the project (summer of 2001).

West Bank Rock Fishing Jetties. Two rock fishing jetties downstream of the existing boat ramp are proposed as mitigation for closure of bank fishing areas during construction. The locations are shown as Item 3 on Figure 2. The configuration of the jetties was developed based on coordination between the Corps, Kentucky Department of Parks, TVA and KDFWR, as well as input from the public scoping meetings. Originally, three jetties were proposed but this was dropped to two jetties due to space limitations. Plan views are shown in Figure 19. The description for the west bank fishing jetties in the DSEIS was incorrect due to a miscalculation of their length and width. A corrected description is provided in this paragraph. The crest length of the upstream and downstream jetties would be 80' and 130', respectively, at elevation of 300'. The upstream and downstream jetties would extend into the river a distance of 130' and 175', respectively. This is measured from the shoreline at elevation 300' to the toe of fill. Both jetties together would have a footprint below elevation 302' of 33,700 ft² (13,700 ft² for the upstream and 20,000 ft² for the downstream). Fill estimates for constructing the jetties have been revised due to improved bottom contours. In order to construct the fishing jetties, an estimated total volume of 5,237 CY of fill material would be placed at or below elevation 302' (1,984 CY and 3,253 CY for the upstream and downstream, respectively). An additional 8,991 CY would be placed above 302' but within the 100-year floodplain. The jetties would be constructed of commercial riprap with a size range of 4" to 18" or shot rock which contained or processed to contain a minimal amount of fines (< 0.5"). The top crest would be designed to accommodate pedestrians. The side slope would be 2.5 horizontal:1 vertical. The downstream jetty would be accessible by an ADA-compliant ramp. Additional paved parking area would be provided on the adjacent land. These jetties would provide shoreline fishing while section of the west bank are closed during active bridge construction. Following construction, these jetties would remain open for public fishing.

3.11 Spillway Training Dikes. During an earlier Kentucky Lock and Dam model site visit at the WES, the KDFWR requested that the navigation model be utilized to evaluate measures to reduce a large recirculation pattern that forms on the west bank near the dam under some flow conditions. This pattern is dangerous for recreational boaters, with boats possibly being recirculated into the spillway release turbulence.

A. **No Action.** Structures to address the recirculation pattern were not considered when the 1992 FEIS was developed.

B. **Proposed Action.** The WES developed a recommended configuration for using three spillway training dikes with plan and cross section views shown in Figure 20. A detailed report on the affects of the spillway training dikes being added with all the other lock project features is included in Appendix B, "Plan C – Spillway Training Works, Kentucky Lock & Dam Model". Shown as Item 12 on Figure 2, the three dikes would be located downstream of the spillway sections adjacent to the existing submerged coffer cells of the old railroad bridge. The crest of the dikes would be at elevation 295' seven feet below minimum tailwater elevation with a crest length of 260'. The top of the old coffer cells is above 295'. Two parallel dikes would extend upstream toward the dam from the third and fourth old coffer cells (direction from the Powerhouse Island). A third

dike would be angled downstream from the third cell. The dikes would be constructed of large rock sized to withstand the high velocities present during flood events. The dikes would be constructed of or plated with commercial riprap (shape of sphere or cube) with a size range of 9.5 (4") to 292 pounds (18"). The Corps is considering using "shot rock" for the interior of the dikes to reduce construction costs. Shot rock would only be used if it contained a minimal amount of fines or was processed to remove fines. The volume of the dikes is estimated to be 94,500 CY. The dikes would create footprints ranging from 42,400 to 52,800 ft².

Inclusion of Spillway Training Dikes in FSEIS. Both TVA and KDFWR desired to evaluate the spillway training dikes while the navigation model was functional. Under NEPA, a case can be made for their inclusion in this FSEIS since the spillway training dikes are a feature that can be reasonably expected to be present in the Kentucky Dam tailwater in the future. One possible direct linkage to the Lock Addition project is by utilizing rock to be excavated as part of the lock chamber construction for the dikes. This rock material would be barge loaded and could be disposed of at the dike locations instead of transported to the Vulcan disposal area. Follow-up cost comparisons will be performed to see if any additional project costs result from the dike construction, if so additional sources of funding (outside of Kentucky Lock funds) would probably be needed since the adverse recirculation problem is not caused by the Kentucky Lock Addition project. Two potential Corps authorities were discussed earlier in Section 1.2.

3.12 Powerhouse Island Contractor Access Ramp and Approach Dredging.

No Action. Contractor access to the Powerhouse Island was not considered during the 1992 FEIS.

Proposed Action. The Corps now proposes to evaluate a contractor access ramp near the downstream tip of the Powerhouse Island. The location is shown as Item 13 on Figure 2. The Corps does not intend to construct this access, but only to evaluate its effect and impacts in case a future contractor wishes to pursue its use. It is likely needed by future bridge contractors. This proposed site has been previously graded for use as an access ramp but is currently covered with riprap. Localized dredging is anticipated to enable work barges to access the ramp. Figure 21 shows the anticipated maximum dredging plan with proposed contours compared to existing contours. The proposed dredging provides a flat plane at elevation 290' and the bank is then sloped at roughly the existing slope to elevation 310'. The volume of excavation is 19,000 CY from a 75,000ft² area (approximately 500' by 150'). Excavated material would be disposed of in either an upland location (VDA) or as part of the spillway training dikes.

3.13 East Bank Contractor Access Ramp (Off-Loading Facility)

No Action. Contractor access to the east bank was not considered during the 1992 FEIS.

Proposed Action. The Corps now proposes to evaluate a contractor access ramp on the east bank roughly 250 feet downstream of the end of the proposed guidewall. The

location is shown as Item 5 on Figure 2. The Corps does not intend to construct this access, but only to evaluate its effect and impacts in case a future contractor wishes to pursue its use. It is likely needed by future lock contractors to accommodate off-loading of material to be disposed of at the VDA. This proposed site has been previously graded for use as an access ramp but is currently covered with riprap. Localized dredging is anticipated to enable work barges to access the ramp. Figure 22 shows an anticipated maximum dredging plan with proposed contours compared to existing contours. The proposed dredging provides a flat plane at elevation 290' and the bank is then sloped at roughly the existing slope up to elevation 310'. The volume of excavation is 6,200 CY from a 52,000ft² area (approximately 350' by 150'). Excavated material would be disposed of in either an upland location (VDA) or as part of the spillway training dikes.

3.14 Existing Lock Riverwall Access Road

No Action. Maintenance access to the existing lock was not considered during the 1992 FEIS.

Proposed Action. In order to provide continuous access to the river wall of the existing lock, some fill placement is proposed to improve an access road. This location is shown as Item 14 on Figure 2. Plan and cross section views of the road are shown on Figure 23. This location is on the upstream riprapped face of Kentucky Dam adjacent to the existing lock. Stone would be placed in order to construct a 20' wide road. Estimated fill volumes are 1440 CY at or below 359' and 3754 CY above 359', although some of the latter volume is above 375' and would not affect flood storage.

Chapter 4 - Affected Environment

4.1 General Environmental Conditions. Land uses in the area around the Kentucky Dam Reservation are comprised of a mix of recreational, forested, meadows, manicured grasslands, major transportation corridors, commercial, and industrial uses. Recreational lands include the Kentucky Dam Village State Park, the TVA Dam Reservation, and the Livingston County Trail system. Most of the Lock Addition Project lands are on TVA Dam Reservation lands, which are primarily manicured grasslands and woods. The abundance of water and food sources (fish) supports an abundance of birds and other wildlife. The TVA lands provide a critical buffer between recreational and commercial/industrial uses. The area is crossed by several major transportation corridors including Interstate 24, U.S Highway 62 and 641, Paducah and Louisville Railroad, and several State and County Routes. Nearby industrial facilities include the Vulcan barge loading facility on the east bank immediately upstream of the dam reservation and the Vulcan rock quarry. Commercial facilities are primarily supported by the local industrial and recreational uses (stores, bait shops, hotels, etc.).

4.2 Previously Covered Resources. The 1992 FEIS and the 2000 EA provided descriptions of several environmental resources and this description is unchanged from the previous documents. Since these documents are incorporated by reference, discussion of these unchanged resources is not duplicated in this FSEIS. The following resources are not discussed in this FSEIS: Climate, Geology, Soils, Groundwater, Air Quality, Land Use, Prime Farmland, Noise, and Wetlands. Note that the 0.11 acres of emergent wetlands impacted by the VDA Haul Road construction were previously covered in the 2000 EA and are discussed elsewhere in this FSEIS.

4.3 Aquatic Resources. The 1992 FEIS provided a description of aquatic biota in the portion of the Tennessee River which would be affected by this project. Some parts of that description were updated in the 2000 EA. The 1992 FEIS provided a description of aquatic biota in the lower Tennessee River (pages EIS 24-27). For this FSEIS, this description is briefly summarized and updated. Aquatic macrophytes are virtually non-existent in the river due to lack of suitable habitat, varying flow, and water elevations. Algal populations, derived from the upstream Kentucky Lake, are dominated by populations of the phyla Cyanophyta (blue-greens) and Chrysophyta (diatoms). Common sport fish taken include channel catfish, flathead catfish, sauger, white bass, paddlefish, and striped bass.

Between 1990 and 1994, TVA sampled the aquatic macroinvertebrates in the Lower Tennessee River at River Mile 15. Those spring-collected samples typically encountered representatives of 25 to 30 benthic species and average densities of 300 to 700 animals per square meter. The dominant groups of invertebrates were mollusks and aquatic insects. Threatened and endangered mollusk species are discussed later in this FSEIS.

A small, first-order stream, Russell Creek, flows adjacent to the proposed Vulcan disposal area and lower haul road route. This stream presently receives industrial storm water discharges from a small settling pond operated by the Kinder Morgan facility

(KPDES Permit No. KY0067423). A 5-acre pond is formed downstream of the proposed disposal area and Russell Creek drains from this pond via a deeply incised (30 feet) channel through softer floodplain materials into the Tennessee River. During 1999, aquatic life in this creek was sampled to evaluate existing (pre-project) conditions. Nineteen families of macroinvertebrates were found, mostly tolerant forms. For its size, Russell Creek was found to support a diverse fish assemblage, with 14 species present. Most of the fish collected are pollution-tolerant species that can endure a wide variety of environmental conditions. No protected invertebrate or fish species were observed in the creek.

Since the surveys for the 2000 EA, the only substantial new aquatic biological information pertinent to this project comes from a survey of native mussel stocks in parts of the project area.

In April 2000, TVA divers examined mussel resources in three areas adjacent to Kentucky Dam: 1) along the west shore of the river from just downstream from Kentucky Dam to just upstream from the newly constructed mooring cells (not part of the lock project), 2) along the east shore just upstream from the upper approach to the existing lock, and 3) along the east shore of the river just downstream from the lower approach to the existing lock. The approximate location of the survey sites is shown in Figure 24. These sites were in areas potentially impacted by the Proposed Action plan where existing information on mussel resources was lacking. In these areas, the divers counted all native mussels they encountered in three 0.25 m² quadrat samples within each of the first, third, and fifth 10-m intervals out from the shore. Note that for transect 9, one sample was inadvertently taken in the fourth 10-m interval (30-40 m). This data was included in the table. Representatives of 16 species were found in the 10 transects searched along the west shore, 2 species were found in the three transects searched along the east shore upstream from the dam, and 9 species were found in the three transects searched along the east shore downstream from the dam. The most abundant species encountered during this survey were the threeridge (*Amblema plicata* - 38 % of the total), the ebonyshell (*Fusconaia ebena* - 32 %), and threehorn (*Obliquaria reflexa* - 7 % of the total). The average numbers of live native mussels encountered in each transect interval are presented in Tables 1 and 2.

Table 1. Average number of native mussels per square meter encountered within 10-m intervals away from the **west** shore of the Tennessee River just downstream from Kentucky Dam, April 2000.

Transect	Upstream				Boat Basin	Boat Ramp	Mooring Cells				Overall
	1	2	5	6	3, 4	7	8	9	10		
Intervals (meters)					0.3						
0 - 10	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
10 - 20											
20 - 30	6.7	10.7	13.3	12.0		20.0	0.0		0.0		9.0
30 - 40								41.3			
40 - 50	4.0	2.7	2.7	12.0		20.0	9.3	12.0	20.0		10.3
											7.8

Table 2. Average number of native mussels per square meter encountered within 10-m intervals away from the **east** shore of the Tennessee River just upstream and downstream from Kentucky Dam, April 2000.

Transect	Upstream approach area					Downstream approach area			
	14	16	15	Overall		11	12	13	Overall
Intervals (meters)									
0 - 10	1.3	1.3	1.3	1.3		0.0	0.0	0.0	0.0
20 - 30	1.3	4.0	0.0	1.8		2.7	6.7	94.7	34.7
40 - 50	0.0	0.0	0.0	0.0		0.0	0.0	10.7	3.6
				1.0					12.7

4.4 Water Quality. Tennessee River below Kentucky Dam is classified by the Kentucky Natural Resources and Environmental Protection Cabinet as an Outstanding Resource Water from RM 12.0 to 22.4 (Kentucky Dam) due to a diverse and abundant assemblage of freshwater mussels and gastropods. This classification is pursuant to 401 Kentucky Administrative Regulation (KAR) 5:031, Section 7(2)(b) and 401 KAR 5:026. Other designated uses of the river are warmwater aquatic habitat, and primary and secondary contact recreation. According to the Kentucky Department of Fish and Wildlife Resources, the tailwater area is considered the most significant recreational and sports fishery in the Kentucky portion of Kentucky Lake. Water quality is generally suitable for these uses, with one possible exception. Under certain conditions, releases from the Kentucky Dam spillways can increase the levels of gasses dissolved in the water

to the point that they adversely affect some fish species. The problem is aggravated by the deep plunge pool below Kentucky Dam followed by shallow shoal areas above I-24. In recent years, this problem has been reduced by changing the opening sequence of spillway gates to reduce the contact time of water released by the spillway gates. The Tennessee River does exhibit variation in suspended solids levels in responses to runoff events.

4.5 Floodplain and Flood Control. Much of the project area is located within the floodplain of the Tennessee River. Water levels are generally controlled by the operation of Kentucky Dam. Tailwater flood heights can be affected by both flows of the Tennessee River and backwater effects from the Ohio River. The 100-year flood elevation has been determined to be at Elevation 346.6 feet with much of the tailwater area below this level. Smaller streams entering the river are low gradient with pools often formed by beaver dams. For the purposes of this FSEIS, any fill placement downstream of Kentucky Dam below elevation 346.6' is considered in the 100-year floodplain.

For the headwater, lake levels are affected by both flows in the Tennessee River and the Cumberland River since Lake Barkley and Kentucky Lake are connected by a canal. Normal winter and summer pool levels are 354' and 359', respectively. The flood control pool goes to elevation 375' (top of the spillway gates). For the purposes of this FSEIS, any fill placement upstream of Kentucky Dam below elevation 375' is considered in the floodplain.

4.6 River Navigation. Kentucky Lock is considered a bottleneck for commercial and recreational traffic on the Tennessee River. Navigation on the Cumberland River is also affected since Kentucky and Barkley Lakes connect by an open canal. Under existing river usage, delays averaging up to 6 hours can occur at the lock. The river is primarily used for commercial barges hauling coal, gravel, and agricultural products. A thorough discussion of the justification for the additional lock project is provided in the 1992 Feasibility Study. The types of vessels and commodities shipped on the Tennessee River past Kentucky Lock in 1998 is provided in Tables 1 and 2 of the 2000 EA. A comparison of historical and projected traffic is provided in Table 3 of the same document.

The average delay per tow at Kentucky Lock has decreased during the period 1996-2000 from 6.59 hours to 3.37 hours. The decrease in delay time was mainly attributable to the reduction in traffic through the lock from 33.5 million tons to 28.8 million tons. Even at 3.37 hours, the existing Kentucky Lock has the longest average delays of any lock on the Ohio River and its tributaries.

As shown in Table 3, coal traffic dropped at Kentucky Lock from 14.2 million tons in 1996 to 10.4 million tons in 2000. This shift in coal traffic accounts for 81% of the overall decline in total traffic. Shown in Table 4, total traffic at Barkley Lock increased from 6.2 million tons to 8.9 million tons during the period 1996-2000. Coal traffic at Barkley Lock increased from 1.1 million tons to 2.7 million tons during this period. The explanation for decreasing coal traffic at Kentucky Lock and increasing coal traffic at

Barkley Lock is explained by the manner in which TVA has reacted to compliance with the Clean Air Act. Some shipments of the TVA coal was re-routed to the Cumberland River because of long delays at Kentucky Lock. The towing industry was slow to do this because (1) the distance to final destinations is longer via the Cumberland River and (2) it is more difficult to navigate the lower Cumberland River because of narrow bends. Additionally, TVA arranged for shipment of western low sulfur coal to a coal blending facility above Kentucky Lock by rail transportation, bypassing the lock with several million tons of coal. This decision was made because of long delays at Kentucky lock.

It is unlikely that the decline in barge traffic at Kentucky Lock will continue. In fact, the coal blending facility above Kentucky Lock has reached a maximum capacity and the western coal that is currently being railed above the lock could be transloaded below the lock in the near future. This low sulfur coal would be barged through the lock directly to the plants. This additional traffic would push traffic levels at Kentucky Lock to the 1996 level. Additionally, the TVA is considering a new power plant project that would require a significant amount of coal be shipped through Kentucky Lock, but no decision will be made until at least late this year. If constructed, there will be a significant increase in traffic to the lock beginning in 2008. This facility would be an Integrated Coal Gasification Combined Cycle (IGCC) plant which produces methane gas. It would be located at Hollywood, Alabama on the property at the unfinished TVA Bellefonte nuclear plant.

Two localized tailwater eddy features affecting river navigation were to be addressed by features proposed in this FSEIS. An eddy forms downstream of the powerhouse island and affects upbound traffic entering the lock approach channel. This eddy tends to push upbound barges towards the Powerhouse Island under some flow conditions. The other eddy is a near the dam on the west bank. This eddy worsens recreational boater safety with small boats being recirculated into dangerous turbulence should they lose power. Figure 16 shows velocity vectors illustrating both eddies under base model conditions.

Table 3

Kentucky Lock Traffic and Delay

Year	Total traffic *	Coal traffic*	Average delay (hrs)
1996	33487	14234	6.59
1997	34009	14685	6.47
1998	33355	13487	5.16
1999	31763	11936	4.59
2000	28836	10467	3.37

Table 4

Barkley Lock Traffic and Delay

Year	Total traffic *	Coal traffic *	Average delay (hrs)
1996	6277	1112	1.37
1997	9477	2911	3.37
1998	9649	2361	2.52
1999	9076	2256	1.35
2000	8967	2569	0.50

* units for traffic is thousand tons

4.7 Terrestrial Flora. A general description of the regional flora is provided in the 1992 FEIS. The flora of the project vicinity has been altered by historical land uses including agriculture, industry, and resource extraction (rock quarry). The area available to terrestrial vegetation in the Kentucky Dam vicinity is limited by the adjacent reservoir and river as well as by several major transportation routes including the P&L Railroad, Interstate 24, and various state and county roads.

Figure 5 of the 1992 FEIS shows a map of existing terrestrial flora and this is relatively unchanged from 1992. Botanical field inspections for the current SEIS were conducted in early spring and early summer of 1999, while performing inspections for the 2000 EA. The relocated highway route and associated land requirements for staging were evaluated in the 2000 EA.

Vegetation on the west bank segment of the project consists of mowed grass areas along the dam and tailwater access road and mixed hardwood-pine and forested wetlands further westward. The hardwood-pine areas are a mix of species including white oak, hackberry, black locust, tulip tree, red oak, and loblolly pine. The wetter forested areas contain sycamore, box elder, red maple, bald cypress, and river birch. Poison ivy is an abundant ground cover in the wooded areas. The west bank highway and railroad embankments were previously approved and are currently under construction. The forested area has been cleared within the embankment corridors.

The east bank areas consist of mixed upland woodlands and open-fields. Much of the east bank area has been altered by quarrying activities and the forests consist of successional species or planted pines. An area of large oaks occurs on a hillside just west of the Walker Cemetery. The area adjacent to the river is mowed or ripped. Areas of bottomland riparian species such as river birch and sycamores occur along Russell Creek.

The Vulcan Disposal Area (VDA) was previously evaluated in the 1992 FEIS, with the exception of the lower access road. This new road is covered in the FSEIS. Widening of this road would impact some of this vegetation including some bottomland species along Russell Creek. The proposed VDA has been stripped by operations associated with a

previous gravel quarry. Gravel covers most of this area although there is some scattered vegetation including black locust, sycamore, sericea lespedeza, cedar, and redbud.

No vegetation of state or regional significance occurs on any of the land anticipated to be impacted by this project. Protected species are discussed in a subsequent section.

4.8 Terrestrial Fauna. A general description of wildlife found in the project area is provided in the 1992 FEIS. Habitats in the vicinity are limited to a mixture of agricultural fields, woodland areas, riparian corridors, and open water habitats. Most wildlife in the vicinity is regionally abundant. Common species include white-tailed deer, eastern cottontail, gray squirrel, red fox, red bats, beaver, box turtles and a variety of songbirds. Large flocks of waterfowl including puddle and diving ducks can be observed above Kentucky Dam. Species often observed include hooded merganser, common loon, mallard, American coot, gadwall, and ring-necked ducks. Large numbers of great blue herons forage along the tailwater below the dam. Large concentrations of gulls also feed below the dam throughout the year. Protected species are discussed in the next section.

4.9 Threatened and Endangered Species.

Terrestrial Plants. In the 1992 FEIS, one federally listed plant species was noted in the vicinity (9 miles to the southeast) of the Kentucky Lock project. The USFWS issued a Biological Opinion (BO) on the project in a letter dated March 1991 (refer to Appendix 2, 1992 FEIS). The March 1991 BO concurred with the Nashville District's determination of "no affect" for the federally listed threatened Price's potato bean (*Apios priceana*). A Supplement to the BO was provided in January 2000 as part of the 2000 EA and the Service concurred with the No Affect (Appendix 3, page 3-36 of the EA).

Price's potato bean (*Apios priceana*) is still the only federal listed plant species reported from the county in which the proposed project area is located. In addition, 11 Kentucky state listed plant species listed in Table 5 are known from within ten miles of the proposed action. Botanical surveys conducted during the spring and summer of 1999 indicated that no federal or state listed plant species occurs on or adjacent to the project lands.

TABLE 5

THREATENED AND ENDANGERED PLANT SPECIES IN THE VICINITY OF THE PROPOSED PROJECT

Scientific Name	Common Name	Fed Status	State Status
<i>Apios priceana</i>	Price's potato bean	LT	END
<i>Halesia tetraptera</i> var. <i>tetraptera</i>	Common silverbell		END
<i>Koeleria macrantha</i>	Prairie junegrass		END
<i>Monarda punctata</i>	Spotted beebalm		END
<i>Sedum telephoides</i>	Live forever		THR
<i>Sporobolus clandestinus</i>	Rough rush grass		THR
<i>Sporobolus heterolepis</i>	Northern drop-seed		END
<i>Carex decomposita</i>	Epiphytic sedge		THR
<i>Carya aquatica</i>	Water hickory		THR
<i>Hydrolea ovata</i>	Hydrolea		END
<i>Lysimachia fraseri</i>	Loosestrife		END
<i>Oenothera perennis</i>	Small sundrops		END

LT = Listed, END = Endangered, THR = Threatened

Terrestrial Fauna. In the 1992 FEIS and 2000 EA, several federally listed species were identified in the vicinity of Kentucky Dam. The Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), bald eagle (*Haliaeetus leucocephalus*), and copperbelly watersnake (*Nerodia erythrogaster neglecta*) are known from areas near the study area. Several state listed species were also discussed in the 1992 FEIS including southeastern myotis (*Myotis austroriparius*), peregrine falcon (*Falco peregrinus*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), and Bachman's sparrow (*Aimophila aestivalis*).

Review of TVA Regional Natural Heritage Databases indicate that 17 state species, in addition to the species formerly discussed in the 1992 FEIS, are reported from Marshall, Lyon, and Livingston Counties in Kentucky. These species include bird-voiced treefrog (*Hyla gratiosa*), barking treefrog (*Hyla avivoca*), western mud snake (*Farancia abacura reinwardtii*), northern crayfish frog (*Rana areolata circulosa*), scarlet kingsnake (*Lampropeltis triangulum elapsoides*), northern pine snake (*Pituophis m. melanoleucus*), eastern ribbon snake (*Thamnophis sauritus*), midland smooth softshell turtle (*Apalone m. mutica*), southeastern five-lined skink (*Eumeces inexpectatus*), Bewick's wren (*Thryomanes bewickii*), fish crow (*Corvus ossifragus*), sedge wren (*Cistothorus platensis*), osprey (*Pandion haliaetus*), bank swallow (*Riparia riparia*), common barn-owl (*Tyto alba*), great egret (*Casmerodius albus*), and brown creeper (*Certhia americana*).

In an associated action, a Biological Assessment was prepared in 1999 to assess impacts from the construction of a new bridge below Kentucky Dam. The USFWS indicated that further impacts to federally listed Indiana bats would need to be addressed. As noted in the BA, results of Indiana bat surveys indicated that construction of a new bridge below Kentucky Dam, would not result in adverse impacts to Indiana bats. The USFWS concurred with this assessment.

Aquatic Species. The 1992 FEIS provided a description of the federally listed threatened and endangered species which occur in the area that would be affected by this project. That discussion was brought up to date in the biological assessment prepared for the 2000 EA and evaluated in the Supplemental Biological Opinion, issued by the USFWS in January 2000. Downstream of the project areas, four federally listed mussels have been historically documented: orange-footed pearly mussel (*Plethobasus cooperianus*), pink mucket pearly mussel (*Lampsilis abrupta*), ring pink (*Obovaria retusa*) and fanshell (*Cyprogenia stegaria*). The latter two species have not been encountered in some time. No changes have occurred in the list or distribution of the threatened or endangered species known from this project area since the 2000 EA was completed. Specifically, no representatives of endangered or threatened species were found during the mussel survey conducted in April 2000.

4.10 Natural Areas (Including Managed Recreational Areas). Several identified natural areas occur within or adjacent to the proposed project area. These areas have been recognized and are protected, to varying degrees, because they contain unique natural resources, scenic values, or recreational opportunities. The following paragraphs offer brief descriptions of each natural area including primary use and available facilities.

- **Kentucky Dam Village State Resort Park**, managed by the Kentucky Department of Parks, is a popular destination for water sports enthusiasts providing the largest marina in the state park system. The park, with its own airstrip, provides accommodations ranging from private cottages and hotel lodging to camping. Other facilities include a golf course, tennis courts, picnic pavilions, and playgrounds.
- **Kentucky Dam State Nongame Wildlife Natural Area** is located on the Kentucky Reservoir and is managed by the KDFWR. The Kentucky Reservoir provides wintering habitat for up to 50,000 gulls from the Great Lakes and Canadian Arctic and Prairie Provinces. During this period, several thousands gulls roost at night on the open water just above Kentucky Dam and often feed below the dam. Visitors can view the gulls from two parking areas at the dam that overlook the reservoir.
- The **Tennessee River Mussel Sanctuary** begins at the Kentucky Dam and extends downstream to Tennessee River mile 17.8. Several state and federally protected mussels are known from this stretch of the river. The KDFWR prohibits the taking of aquatic mollusks and/or the destruction of their habitat in this section of the Tennessee River.

- From the Kentucky Dam downstream to Tennessee River mile 12.0, the Tennessee River has been designated an **Outstanding Resource Water** by the Kentucky Natural Resources and Environmental Protection Cabinet. Several state and federally protected mussels are known from this stretch of the river. Both agencies encourage management practices in this section of the river that maintain existing water quality and wildlife habitat.
- **Taylor Park Campground (TPC)**, located on the right descending bank of the Tennessee River immediately upstream of the Kentucky Lock, is owned by TVA and was temporarily closed in 1997 due to a lack of funding for maintenance. Since the closure of TPC, the public has been directed to other campground facilities on and/or near Kentucky Reservoir Reservation. The former campground lands encompass 15.5-acres and, at one time, included 42 campsites, many of which were waterfront. Construction activities related to assembling the lock addition, including equipment storage and contractor staging, are proposed to occur at Taylor Park Campground.

In addition, the following natural areas are located within three miles of the proposed project:

- The **Barkley Reservoir Reservation** and **State Wildlife Management Area** is located 2.4 miles east of the proposed project site. The U.S. Army Corps of Engineers owns and manages this 76,831-acre flood control reservoir. Nearly 50,000 acres are licensed to the KDFWR for wildlife management.
- **Cypress Creek Swamp** is located 0.75 miles southwest of the proposed project site. The Kentucky Chapter of the Nature Conservancy (KY-TNC) monitors this relatively undisturbed cypress-tupelo swamp and bottomland hardwoods. Three disjunct tracts within the swamp are owned by TVA and managed under a Memorandum of Understanding with KY-TNC.
- The **Cumberland River State Mussel Sanctuary**, which extends from Barkley Dam (R.M. 30.6) downstream to Highway 62 (Cumberland River Mile 30.0), is located 2.4 miles east of the project site. The KDFWR prohibits mussel collecting and/or the destruction of habitat in this section of the Cumberland River.
- **Land Between the Lakes National Recreation Area (LBL)** is located 2.5 miles southeast of the proposed project site. This area is managed by the U.S. Forest Service as a national demonstration in outdoor recreation and environmental education. This particular section of LBL has also been designated an **International Biosphere Reserve** by the United Nations Educational Scientific and Cultural Organization. Hunting within this portion of LBL, a **State Wildlife Management Area**, is administered by the KDFWR.

4.11 Recreation. The 1992 FEIS fully described the existing conditions of the recreational use of the project area. In support of the U.S. Coast Guard bridge permit application, a Draft Section 303 Statement was prepared in December 1999 that updated

recreational information. The 2000 EA utilized this information. The only change since then has been an increase in public recreation use of facilities in the area. This includes camping, fishing, informal recreation, and general visitor use of the lock facilities. According to the KDFWR, the tailwater area is considered the most significant recreational and sports fishery in the Kentucky portion of Kentucky Lake. As can be seen in Figure 1, the tailwater area is heavily used by recreational fishing craft.

4.12 Visual and Aesthetic Resources.

Access Road to Vulcan Disposal Area. An old roadway currently barricaded to vehicular traffic has been upgraded to a 14-foot-wide asphalt trail. This pedestrian/bikeway (trail) begins at the Saunders Archaeological Site parking lot on the reservation, and connects Kentucky Dam Reservation with the commercial establishments at the I-24/Highway 453 interchange and is a part of the Livingston County Trail System. The trail passes along the base of a steep partially wooded hill as it leaves the reservation. Overhead powerlines are visible as the trail approaches and crosses Russell Creek in a lower-lying area. The trail is generally level as it passes sections of woodland and open meadow areas. A partially wooded section of landscape that includes a small pond and dike are somewhat visible from the paved trail and would be affected by the proposed access road.

Taylor Park Campground Use and Mitigation. Overall views of Kentucky Lake and the lock approach exist from the TPC area but are hampered by the noise and dust generated by the adjacent Vulcan barge loading operation and exhaust fumes from barge traffic. The lower level of TPC currently is level and low-lying and contains scattered cottonwood trees. Views of the Vulcan barge loading area are partially blocked by vegetation and an unsightly stacked tire wall. Areas affected by planned mitigation for the campground closure are as follows:

- The new lock visitor's center is to be a part of the operations building which would be adjacent to the east wall of the new lock. This area currently is a part of the existing reservation open to the public. It consists of roadways passing through areas of mowed lawn with large shade trees and a visitor parking area.
- The west side of Powerhouse Island currently consists of relatively steep riprapped shoreline extending downstream from two levels of the island. Views of the tailwater and lock approach are visible from this area. Tailwater bank and boat fishing are among the activities frequently viewed by the public from this area. Views of swift water movement produced by power generation and at times reservoir spilling over the dam are sites additionally seen in this area. The lower downstream point of the island has been maintained in turf with only walking access.
- The public parking area adjacent to the switchyard is utilized by the public for viewing tailwater activities. A portion of this parking, sidewalk, and turf area is to be used for a new restroom.
- An old coffer cell adjacent to the west bank of Powerhouse Island is visible to and used by the public as a fishing access point at low tailwater levels. Portions of the railing around this cell have been damaged or are missing due to high water

movement. The closest views of the generation boils below the powerhouse are seen from this facility. Additionally, the cell is heavily used by fisherman to dip shad as well as a fishing access point. Concrete steps exist down the riprap slope to access some lateral fisherman walks in the riprap as well as the coffer cell.

- The west bank of the Tennessee River from Kentucky Dam to the boat ramp consists of a steep, riprapped shoreline. A group of lateral walks accessed by steps just downstream of the left bank wing wall provide fishermen with access to the shoreline. A large amount of fishing activity can be seen along this shoreline at various points on the riprap in addition to that of boater activity fishing in the adjacent tailwater. The west bank can also be seen as a site of high water inundation as it is flooded at times from spilling over the dam.

East Bank Boat Ramp and West Bank Boat Basin (Mitigation Use). The existing east bank boat ramp is the old ferry landing and is in poor condition for boat launching. The west bank boat basin is currently a narrow indentation in the shoreline. It supports a walkway used at low water level which provides partial access to bank fishermen. Vegetative cover has grown in the boat basin's riprapped side slopes and hampers shoreline fishing access.

Upstream Lock Features (Approach Walls). The lake surface to be affected by the installation of the upstream approach walls lies directly in front of TPC and the Vulcan barge loading facility. This area is mainly visible to barge, recreational boat, lock visitors, and fisherman traffic.

Downstream Lock Cofferdam, Approach Walls, and Approach Channel. The right bank downstream lock approach is visible to visitors to the reservation, barge traffic, and recreational boater and fisherman traffic. Portions of these open areas are manicured grass or riprapped slopes.

Navigation Training Dike. The proposed training dike is proposed off the west bank of the downstream tip of Powerhouse Island. It is in an open riprapped area visible mostly to bank and tailwater boat fishermen and locking river traffic.

West Bank. The west bank tailwater shoreline is heavily used by fishermen dependent on season and flow rates. The visiting public also utilizes the area proposed for temporary closure for viewing of the dam and tailwater. It is in an open riprapped area visible mostly to bank and tailwater boat fishermen and tourists.

4.13 Historic and Cultural Properties. A general description of the cultural resources of the region is provided in the 1992 FEIS (Pages 33-34). Figure 25 (originally Figure 8 of the FEIS) shows approximate locations of historic or cultural resource sites. Both prehistoric Native American cultures and more recent Euro-American settlers have utilized the area. The proximity to the river has influenced these historical uses. Both TVA and the Corps have conducted cultural resource surveys of the lands to be affected by project activities. Two known archeological sites located within the general area are eligible for listing on the National Register of Historic Places (15Lv204 and 15Lv24);

however, both of these sites are away from the lands to be affected by the lock project. For the purposes of the FSEIS, Site 15Lv204 is considered the same site as 15Lv22. Both sites are on the opposite (north) side of Russell Creek from any project-affected lands. One additional archeological site (15 Lv12) is located within the project area. This site is located below (is “protected” by) a thick layer of fill from the original Kentucky Dam construction. There is an existing berm between the site and any lands to be disturbed by the project. This berm is to be undisturbed during construction of the VDA Haul Road. The Kentucky Lock and Dam facility and associated structures, themselves, have been determined to be eligible for listing on the National Register of Historic Places.

4.14 Socioeconomics. The three Kentucky counties of Livingston, Lyon, and Marshall comprise the core of the project area where construction activities and other impacts would be expected to occur. The eight peripheral counties surrounding this core would be expected to potentially receive some reduced effects. As experienced in the Olmsted Lock and Dam project on the Ohio River, much of the construction work force would likely come from the Paducah - McCracken County area.

4.15 Environmental Justice. The project area has a minority population and a poverty rate lower than the state of Kentucky as a whole. The dam and lock are located in Livingston County, Census Tract 402, and Marshall County, Census Tract 9503. These census tracts have minority populations and poverty levels slightly lower than their respective counties. In Livingston County, as of the 1990 Census of Population (the latest available at this time), census tract 402 had a poverty rate of 15.0, compared to the county rate of 15.5. Similarly, in Marshall County, census tract 9503 had a poverty rate of 12.2, compared to 14.1 for the county. In Livingston County, according to the 2000 Census of Population, the minority population in Census Tract 402 is 2.1 percent, compared to 2.0 percent countywide. In Marshall County, the minority population constituted 1.7 percent of the total in Census Tract 9503, compared to 1.9 percent countywide. All of these percentages, including the counties, are well below the state averages.

Chapter 5 - Environmental Consequences.

5.1 General. In this section of the FSEIS, a comparison of the impacts of the No Action and Proposed Action plans is made. The No Action plan is the previously approved version as covered by the 1992 FEIS or the 2000 EA. The Proposed Plan includes design changes or refinements made to the project since the earlier documents and features that were not known when the earlier documents were prepared. Several major features, including the size of the new lock chamber, relocated railroad and highway bridges, and the Vulcan Disposal Area are common to both plans.

For the sake of comparison, the No Action plan will be compared to the Proposed Action plan for each individual project feature. It is again emphasized that each feature is independent of another feature, so an individual item could be dropped or modified without affecting the overall lock construction to a significant degree.

5.2 Previously Covered Resources. The 1992 FEIS and the 2000 EA provided descriptions of impacts to several environmental resources and the impacts are unchanged for some resources. Since these documents are incorporated by reference, discussion of these unchanged impacts is not duplicated in this FSEIS. For these resources, impacts under both the No Action and Proposed Action are the same. Since these environmental consequences were adequately addressed in the 1992 FEIS and 2000 EA, no further discussion is required. The Proposed Action does not add any environmental consequences for the following: Climate, Geology, Soils, Groundwater, Air Quality, Land Use, Prime Farmland, Noise, and Wetlands. Note that the 0.11 acres of wetland impacts associated with final design of the VDA Haul Road were included in the Benton, Kentucky wetland mitigation site. During development of the 2000 EA, wetland impacts resulting from the VDA Haul Road were conservatively over-estimated at 0.25 acres in order to facilitate development of a mitigation site for the entire Kentucky Lock Addition project. The same area of impacts associated with the VDA Haul Road were included with the 6.75 acres associated with the railroad and highway relocations on the west bank. Mitigation sites were evaluated to offset a total of 7 acres of impacts at a 2:1 mitigation ratio. This is discussed in detail in the 2000 EA and also in the responses to EPA (Item 10 of Appendix A).

5.3 Aquatic Resources.

No Action

Potential effects of the construction and operation of the new lock on aquatic life are presented in the 1992 FEIS. Some modifications to the project associated with the construction of the highway and railroad bridges also are presented and evaluated in the 2000 EA. Both evaluations included some commitments to survey and/or relocate resident mussel and gastropod stocks to avoid or minimize potential adverse effects associated with components of the project. As shown in the 1992 FEIS, the downstream aquatic disposal site at TRM 19.7 was selected to improve (create) additional mussel habitat with the dredged material. More channel excavation (upstream and downstream)

would be required with the No Action lock location since the lock would be shifted 20 feet toward the shore. Short-term disturbances would result from the placement of stone on the right-bank between Russell Creek and the Interstate 24 Bridge, including a haul road crossing of Russell Creek. No other potential impacts on aquatic life were identified.

Proposed Action

A number of modifications have been proposed in the updated details of this lock construction project. The following evaluation considers all of the proposed modifications within four geographic areas: upstream from Kentucky Dam, along the west tailwater shoreline, along the east tailwater shoreline, and on Powerhouse Island. One aquatic resource protection measure which would apply to all construction activities downstream from Kentucky Dam is the requirement that no bottom-disturbing work (such as dredging and blasting, but excluding work on the bridge piers) occur during March and April. A similar restriction on in-water work in Kentucky Reservoir would run from April 15 to June 15. Both of these restrictions would help avoid impacts to various species of fish that spawn in the tailwater and the reservoir.

Upstream - Five possible modifications in the project plans are proposed to occur upstream from Kentucky Dam. No adverse effects to aquatic life would occur associated with **not building new mooring cells or mooring buoys** just upstream from Kentucky Dam because no construction activity related to those facilities would occur in the water. The decision not to build these mooring facilities would not result in adverse operational effects on aquatic life because the new lock is expected to handle down-bound traffic without the need for barges to wait (and, potentially, disturb bottom habitats) before being able to move into the lock.

Building a **new visitor center** at the dam and the **use of the Taylor Park Campground** area during the construction period would not have adverse effects on aquatic life so long as appropriate erosion and sedimentation control measures were followed on those terrestrial construction sites. The use of erosion control BMPs on those construction sites would prevent or substantially minimize the loss of sediment into the reservoir and would avoid any significant impact on aquatic life.

The upstream approach to the new lock is proposed to include a floating **guidewall** (w/3 support cells) and some **channel dredging** (8.23 acres) on the bottom of Kentucky Reservoir. Considerably less bottom habitat and aquatic life would be disturbed in the process of constructing three 10-foot diameter support cells than the twenty 36-foot diameter cells included in the previous design. Dredging would be required for draft requirements of the floating lockwall, but less bottom area would be permanently covered. Results of the recent dive survey in this upstream area (Table 2) indicate that very few native mussels (approximately 1 individual per m²) occur in the area which would be dredged. The fill placement for construction of an **access road to the existing lockwall** would require some riprap placed over existing riprap on the face of the dam. This construction work would result in only an insignificant effect on native mussel resources in this part of Kentucky Reservoir. The construction and operation of these

modified project features upstream from Kentucky Dam would not have any adverse effect on other bottom life or fish populations in this area.

West Tailwater Shore Several proposed modifications would affect the Tennessee River downstream from Kentucky Dam generally along the west shoreline. The most upstream of these potential modifications actually would occur in the middle of the river, where **spillway training dikes** may be installed upstream and downstream from the cells which supported a previous railroad bridge. Appendix B (Item 2) contains an evaluation of potential effects of the navigation training dike and spillway training dikes on river velocities and bottom substrate. This evaluation was prepared by the TVA - Norris Hydrologic Laboratory using data produced by WES and is titled “ Kentucky Lock, Impacts of New Lock On Tailwater Mussel Beds” and concluded that after construction, similar velocity conditions would remain at downstream mussel beds. If constructed, these rock dikes would occupy approximately 146,000 square feet of river bottom extending downstream from near the base of the dam. Results from the mussel survey conducted for the 2000 EA indicate that very few native mussels (between 0.5 and 2.0 mussels per m²) occur in the middle of the river where these dikes would be built, indicating that the dikes would displace very few native mussels. Mussel relocation is impractical for the area of the spillway training dikes due to the depth and proximity to the powerhouse and spillways and the danger of debris on the bottom. Snails and some other bottom-dwelling aquatic species would colonize the new habitats on the dikes. Flow studies conducted by the WES suggest that these dikes would modify fish habitat conditions on the river bottom. These revised conditions are likely to enhance fish foraging instead of reducing it. The dikes are intended to reduce the recirculating current which occurs just downstream from the dam under certain spilling conditions. The dikes are not intended to address gas supersaturation levels but would have minor positive effects, if any. Overall, the installation of these dikes would result in modest long-term benefits to aquatic life in the tailwater.

A new **fishing pier** is proposed to be built along the west shore of the river, under the west end of the new highway bridge. One additional support column would be constructed in the water at the nearshore end of this fishing pier (see Figure 6). The support column at the end of the pier is the technique shaft for the relocated Highway Bridge and is being constructed under both the No Action and Proposed Action Alternatives. Construction of the single 6-foot diameter support column in the water and the on-shore parts of this pier would have only an insignificant effect on the bottom habitat and aquatic life in the river.

Also proposed is the **enlargement of the existing boat basin** located along the west shore downstream from Kentucky Dam. Much of the enlargement of the existing basin would be conducted in the dry and isolated from the river by a weighted silt curtain. There would be some minor dredging to deepen the existing basin to the design bottom elevation (293'). The removal of the lowest material would then allow connection to the existing boat basin and the final shaping of the bottom of this basin would be completed. The results from the April 2000 survey (Table 1) indicate that very few mussels occur in or near the boat basin (an average of 0.3 per m²). In fact no mussels were found in the

first 10-meter interval out from the river shoreline on any of the transects. Careful attention to sediment control BMPs and limiting bottom disturbance to areas within 10 meters off the present shoreline, would result in only minor and insignificant impacts on native mussels and other benthic life. Construction of this enlarged basin would not have any adverse effect on fish populations.

The boat basin proposal includes a floating courtesy dock for recreational boaters. These additional modifications and the projected future recreational use of the boat basin would not have any adverse effects on aquatic life in the river.

The **existing boat ramp** along the west shore just downstream from the boat basin would be extended to better handle recreational use during the construction period. Results from the April 2000 mussel survey indicate that no native mussels occur in the first or third 10-meter interval of the transect located just downstream from this ramp (Table 1). Thus adding an additional section of concrete to become the offshore end of this ramp would have only an insignificant effect on native mussels and other benthic life.

Additional recreational fishing features proposed downstream from the existing boat ramp include **two new rock jetties and an associated paved parking area**. Construction of the parking area and associated on-shore parts of this work would not have any adverse effects on aquatic life if appropriate BMPs are followed to minimize erosion from the disturbed areas and sedimentation in the river. These jetties would cover a footprint of approximately 33,700 ft² of river bottom. Results from the April 2000 mussel survey (Table 1) indicate that no native mussels occur in the near shore (0-10 m) areas and few in the 20-30 m interval. A larger number of mussels encountered 30-40 meters off shore would be affected by the rock jetties. The maximum length is about 53 meters for the downstream jetty footprint. Relocation of any mussels that may be present in the areas affected by construction of the jetties and the use of appropriate BMPs during construction of the on-shore facilities would allow these features to be built with only minor impacts on aquatic life. In addition to the footprint of the jetties, mussels would be relocated an additional 5-10 meters around the footprint as a buffer. Refer to Appendix A, Item 10 for more specifics on mussel relocation plans.

Long-term use of these new fishing jetties would not result in any adverse effects on aquatic life in the river. Many types of bottom-dwelling species, including native mussels and snails, would colonize the side slopes of the jetties and/or suitable parts of the substrate in between them. The relatively small size of the jetties would have an insignificant affect on the numbers or distribution of any aquatic species (fish, mussels, etc.) populations.

East Shore Five proposed modifications of the previously evaluated plans for the new lock project would affect the east shore of the river. The most extensive of these modifications involves revised plans for the **downstream lock cofferdam, downstream approach walls, and downstream approach channel**. The substantially smaller area which would be dewatered behind this cofferdam and the elimination of the previously

proposed dredging of the approach channel would greatly reduce or avoid many of the potential effects on aquatic life which could occur under the No Action Alternative. The downstream disposal site (TRM 19.7) has been eliminated, although this site was selected to create additional mussel habitat. Some in-water work associated with the construction of the cofferdam and approach walls would still occur; however, all of this activity would occur immediately adjacent (within 37 feet) to the existing shoreline from just downstream from the tip of Powerhouse Island upstream to the existing lock. Results of the April 2000 mussel survey (Table 2) indicate that no mussels occur along the shore in this area; however, increasing numbers of mussels occur downstream and outside of the navigation channel (up to at least 95 per m² downstream from the proposed impact areas - transect 13). Minor additional dredging would occur for the **railroad bridge truss float-in** (100 CY) (Figure 13) and the **east bank contractor access ramp** (6,200 CY) (Figure 20). The use of applicable BMPs to control erosion and the in-water movement of disturbed sediment would reduce the impacts of these construction activities on aquatic life to insignificant levels. Mussel relocation is proposed for the areas to be filled or excavated along the east shore.

Some **blasting** along the **east side of the navigation channel** and in the area of the cofferdam (also **upstream of the dam at the new lock intakes**) would be performed to loosen rock prior to excavation. This blasting has the potential to cause fish kills and increases in turbidity. Turbidity levels should not affect aquatic resources to a great degree, since this work would be restricted during fish spawning season per the water quality certification. Contractors performing blasting would be responsible for damages to fish and, therefore, will be encouraged in specifications to minimize potential blasting effects by utilizing smaller charges, bubble screens, and scare blasts.

Also proposed is widening the existing **access road to the Vulcan Disposal Area** along Russell Creek from near its mouth on the river upstream to the disposal area. Much of this access route would be adjacent to the creek and would cross it at one point. Information about aquatic life in Russell Creek, presented in the 2000 EA, indicates that a relatively wide variety of species are present for a stream that (small) size; however, most of the species are relatively silt tolerant. The use of appropriate erosion and sedimentation control measures during the construction and use of this access road would reduce the effects on aquatic life in Russell Creek to insignificant levels. Fill placed in Russell Creek for the widened crossing is to be removed after construction per the recommendations of the USFWS in the 2000 EA.

The proposal to **not build two new mooring cells** downstream from the new approach wall would not result in any adverse effects on aquatic life in the river because no construction activity would occur at the previously considered sites. Present thinking is that the new lock would handle traffic quickly enough that the two existing mooring cells downstream from the dam and two sets of existing mooring buoys downstream from the I-24 bridge would be sufficient to accommodate any waiting up-bound traffic.

Powerhouse Island area The five proposed modifications which would occur in this part of the tailwater are considered separately from the remainder of the east shore

because they are essentially unrelated to the proposed modifications along the river bank. The proposed **new railing** (safety feature) **on an existing coffer cell** would not have any effect on aquatic habitats or aquatic life in the river.

Two other proposed modifications involve the construction of a **new fishing pier** extending off of Powerhouse Island essentially under the new highway bridge and the construction of a **new public parking area and restroom building** on Powerhouse Island. One additional support column would be constructed in the water for the nearshore portion of this fishing pier, along with appropriate structures built on the riprap river shoreline. Construction of the single 6-foot diameter support column in the water would have only an insignificant effect on the bottom habitat and aquatic life in the river. The support column at the end of the pier is the technique shaft for the relocated Highway Bridge and is being constructed under both the No Action and Proposed Action Alternatives. A proposed contractor access ramp near the end of the island would require some approach dredging with the maximum footprint (82,500 ft²) of the dredging shown in Figure 19. Mussel relocation is proposed prior to dredging in this area. The use of erosion control BMPs on the parking area and restroom construction sites, would prevent or substantially minimize the loss of sediment into the river and thus result in only insignificant impacts on aquatic life.

One additional proposed modification on Powerhouse Island would be a short **navigation training dike**. Results from the mussel survey associated with the new highway bridge, presented in the 2000 EA, indicate that mussel abundance along the downstream part of the west shore of Powerhouse Island is approximately 0.5 per m², thus indicating that this training dike would result in only insignificant impacts to native mussel resources. Extensive model studies conducted at the WES and a variety of related evaluations (Item 2 of Appendix B) indicate the navigation training dike would result in minor and insignificant changes in water velocities in areas over existing mussel habitats between Powerhouse Island and the I-24 bridge. The results of that evaluation indicate that, while the sizes of particles on the bottom in the mussel habitats might change slightly because of the effects of the training dike, those areas would remain suitable mussel habitats. This information supports the conclusion that installation and operation of the navigation training dike would result only in insignificant effects on native mussel resources and other aquatic life in the river.

5.4 Water Quality. Both the No Action and Proposed Action Plans have several duplicate potential water quality impacts from the construction of the main lock chamber, the Vulcan disposal area, and bridge relocations.

No Action. The No Action plan included much more bank and adjacent channel excavation downstream of the new lock to the mouth of Russell Creek. The position of the new lock required more right-bank and downstream navigation channel excavation. The larger excavation would result in both more dry and wet excavation and potential water quality impacts. This would result in short-term impacts on water quality due to increased suspended sediment loads. A large area of the existing navigation channel

would be dewatered by the larger downstream cofferdam and this area would have to be maintained dewatered throughout construction.

Other features of the Lock Addition project that were included in the 1992 FEIS (a.k.a. No Action) were the channel excavation along the right margin of the navigation channel above I-24 bridge and the aquatic disposal site at TRM 19.7, Right Bank. These impacts would continue with the design of the new lock as proposed in 1992. The new lock was downstream about 200 feet and landward about 20 feet of the currently proposed design. Stone excavated would be used to riprap the shoreline from Russell Creek to the Interstate 24 Bridge. This in-stream excavation features and bank work would result in temporary increases in suspended solids during dredging and loss of benthic organisms from the disturbed bottom areas. Relocation of mussels would likely be required by the Kentucky Division of Water and others under the existing regulatory climate. The placement of material in the aquatic disposal area would ultimately provide some improved mussel substrate, because the site was selected due to its poor existing substrate characteristics (predominantly fine grained sediments).

Proposed Action. Impacts to water quality of the various features now proposed to the project are discussed.

Haul Road to the VDA. The construction of the access road to the VDA would result in some fill placement at the crossing of Russell Creek and minor wetland areas in the drainage below the pond and adjacent to the Russell Creek crossing. Mitigation for up to 0.25 acres of wetland impacts was included in the Benton, Kentucky mitigation site (per the 2000 EA). Based on the final design of the haul road, actual wetland impacts are 0.11 acres. A 285-foot section of a blue-line tributary to Russell Creek would be relocated due to the widening of the haul road just north of the pond. This relocation is unavoidable since space is restricted by the dike forming the pond. Over time, the relocated channel should provide equal aquatic habitat after stabilization and recolonization. The work would be staged to allow a stabilized relocated channel prior to diversion of flow from the existing channel. The widened haul road would result in increased potential for erosion due to the added disturbed areas, however, with proper use of BMP's this should be minimal. Fill placement at the Russell Creek crossing would be removed after construction uses of the haul road are terminated (per the March 2000 USFWS Fish and Wildlife Coordination Act Report). The use of the access road for haul truck traffic would result in short-term increases potential for fuels and oil spills along the route. On a regional basis, this risk would be slightly reduced from the No Action Plan since the same amount of material would be taken to the VDA using smaller capacity haul trucks (more trips) via a longer route.

Mitigation for the Loss of TPC (Visitor's Center, Two Fishing Piers, Powerhouse Island Restroom and Parking). The construction of features proposed as mitigation for the closure of the TPC would slightly increase erosion potential (for land-based construction) and aquatic habitat displacement/turbidity generation. The Visitor's Center, Powerhouse Island parking and restroom, and land ramps to the fishing piers would result in minimal increased area disturbed by construction and to be protected by

BMP's. Short-term increases in erosion potential would result from construction of these features. The two fishing piers would result in very minimal (28 ft² each) bottom displacement from the one additional near-shore pier.

Use of TPC During Construction (Fill Placement). The placement of fill material in the lower level of the TPC would result in increased potential for erosion from the site. BMP's would be implemented to minimize this risk.

Mitigation for Closure of East-Bank Boat Ramp (Expansion of West-Bank Boat Basin). The expansion of the west-bank boat basin would result in increased potential for erosion. Much of the basin excavation would be performed in the dry, however, some wet excavation would be required for the final portion of expansion and for deepening the existing basin. A weighted silt curtain would be placed around the mouth of the basin and any length of disturbed shore to reduce turbidity entering the river during excavation.

Dredging of upstream and downstream lock approach walls and channel. With location of the new lock moving upstream about 200 feet and riverward about 20 feet, the amount of dry and wet excavation is much reduced, eliminating resulting water quality impacts. The proposed plan still does include some dredging/excavation of river bank and approach channels although the amount of area affected is greatly reduced from the No Action plan. Potential impacts include temporary increases in turbidity during excavation and blasting, and minor but permanent displacement of some existing aquatic habitat by the new lock walls. The area (habitat) permanently covered by the lock features is reduced with the use of floating guidewalls which are mounted on drilled shafts.

Dredging for contractor access at east bank and Powerhouse Island. Dredging for contractor access to the Powerhouse Island and east bank would require some approach dredging/excavation to enable work barges to access the shore. This would result in the same impacts as described in the previous paragraph. These impacts would be short-term only.

Fill Placement for dikes and fishing jetties. The navigation and spillway training dikes would result in rock fill placed over the footprint of the dikes. The former would have some fill above the ordinary high water (302'); fill for the latter would be underwater at all times. This fill placement would result in minimal and temporary increases in turbidity and displacement of existing bottom aquatic life. The fill material is to be commercial riprap or shot rock with minimal fines to minimize turbidity generation from the construction. In the long-term, the dikes would provide improved aquatic habitat from the rock structures. For the west-bank fishing jetties, impacts would be the same as described for the dikes.

404(b)(1) Evaluation. Fill placed below ordinary high water requires a 404(b)(1) evaluation to be performed and 401 Water Quality Certification from the Kentucky Division of Water. Fill placement should be considered only after avoidance, minimization, and justification steps are performed. For some features, avoidance is not

possible unless the structure is not constructed. For other features, modeling and structural evaluations were performed to determine the minimum size structure that performs the intended function (i.e. training dikes).

For the purposes of the Clean Water Act (CWA) Section 404(b)(1) evaluation, the pier structures of the relocated bridges in the channel of the Tennessee River are covered by the Corps' Nationwide Permit #15, contingent on the issuance of the USCG bridge permit. The complete Final 404(b)(1) evaluation is provided in Appendix B (Item 3). A Public Notice 01-15 File No. COE-172 was issued on February 23, 2001, concurrent with circulation of the DSEIS, for comment on activities regulated under Section 404.

No Action. The No Action plan would result in more impacts to aquatic resources and water quality in the immediate area of the new lock chamber and approach channels due to more in-stream construction and a larger dewatered area.

Proposed Action. This plan would result in less impact in the immediate lock chamber area but would add additional features that were not part of the project in the earlier NEPA documents. The impacts of the additional features are not expected to result in significant impacts to water quality with proper BMP use, visual turbidity monitoring and relocation of mussels where feasible. The potential water quality impacts during construction would be minor and short-term. Some minor long-term positive effects would result from the improved habitat features such as jetties and training dikes. Other features would not result in significant effects.

5.5 Floodplains and Flood Control.

No Action. The No Action Plan would not result in any additional impacts to floodplains or flood control, with the exception of the larger dewatered area for the downstream lock features.

Proposed Action. Several of the various features added in the proposed action alternative do require fill placement within the floodplain. Appendix B (Items 4-6) contained three memoranda discussing the impacts to tailwater and headwater flooding due to the placement of floodplain fill and in-stream structures. For both the No Action and Proposed Action, there is no practicable alternative to the proposed construction activities in the floodplain due to the nature of the facility and therefore the Proposed Action plan would be consistent with Executive Order 11988.

Headwater Floodplain Fill. Upstream of Kentucky Dam, floodplain fill (below 375') is proposed for the lower level of the Taylor Park Campground and the access road to the existing lockwall. The former is required to elevate the portion of the TPC for use as a storage and stockpile area during construction and would result in significant reduction in construction costs for the new lock. Alternatives to filling the TPC would be to haul this material to the VDA or another upland area resulting in more disposal costs and increased haul traffic. The fill placed in TPC would reduce the storage capacity of Kentucky Lake for the period in which the fill remains. The total anticipated fill volume is

approximately 400,000 cubic yards (CY) over the life of the construction project, with approximately 147,500 CY in place at any given time. Most of the fill would be removed and used as backfill for the new lock. The TVA issued a Letter of No Objection regarding fill placement in TPC. Access road fill is required to maintain continuous access for maintenance to the existing lock riverwall during construction. It requires a minor volume of fill (3,754 CY) but it would be permanent. The flood storage pool for Kentucky Lake encompasses 4,008,000 ac.-ft., or 6,466,240,000 CY. The fill proposed for TPC represents a fraction (.000023 percent) of the total flood storage capacity. Thus, the effect upon headwater flood elevations would be insignificant.

After completion of the lock project and removal of the stockpiled material and cellular cofferdams, the total reservoir volume would increase. Exact figures have not been calculated, but it is anticipated that any fill remaining in TPC would be considerably less than the additional volume provided by the new lock approach excavation and the volume upstream of the new gate pintles that was formerly behind the cofferdam. Therefore, long-term impacts to the headwater floodplain are minimal to positive.

Tailwater Floodplain Fill. Several features in the tailwaters would also affect floodplain capacity. In the east bank tailwater area, construction of the Vulcan Disposal Area access road would result in approximately 28,000 CY of permanent fill being placed below the 100 year flood plain elevation of 346.6', along the east bank of the lower tailrace and extending up the Russell Creek Tributary.

Fill placement for construction of the access road is anticipated to begin at TRM 21.5 and end at TRM 22.0, as measured perpendicular to the centerline of the river. This fill is required to widen the route to accommodate two-lane haul truck traffic.

In the west bank tailwater area, fill associated with construction of the relocated railroad and highway embankments and west-bank disposal area (under both the No Action and Proposed Action plan) would be partially offset by enlargement of the boat basin. The volume of fill associated with construction of the relocated railroad is equal to 192,500 CY. The volume of fill associated with construction of the relocated highway is equal to 112,000 CY. The west bank disposal area is anticipated to reach a volume equal to 253,500 CY. The floodplain storage area gained by enlargement of the boat basin is equal to 139,000 CY. Thus, the net west bank fill is equal to 419,000 CY.

Construction activities in the tailwater below Kentucky Dam are limited to the area between the embankment face and TRM 21.5. Typical cross sections of this area were taken from a hydraulic (HEC RAS) model of the Kentucky tailwater created by Corps. This model estimated water surface elevations based on flow and channel cross-sections. These sections show that the volume of the shape bounded by the 100 year flood plain elevation of 346.6' and the river sections at the embankment face and TRM 21.5 is approximately 22,493,071 CY. The total anticipated fill placement in the TW, both east bank and west bank, is approximately equal to 447,000 CY.

Numerical modeling of TW conditions after construction of the RR and HWY embankments has been conducted. This analysis was performed by the Corps, with results presented in Memorandum for Record dated 5 January, 1999. The memorandum concluded that the backwater impacts to the Kentucky Dam Powerhouse from the proposed Railroad and Highway Bridges are minimal.

The proposed floodplain fill in the tailwater area, excluding the RR and Hwy embankment fill, between the dam embankment and TRM 21.5, is equal to 114,500 CY. This represents 0.0051 percent of the volume of the floodplain. Most of the fill would occur in flood storage areas that are not part of the active conveyance, thus having a lesser impact on the flood heights. Detailed analyses of the fill impacts via hydraulic model are not necessary given these considerations. The conclusion to be drawn is that construction of tailwater improvements would not have a significant impact upon the post construction flood elevations in the project tailwater.

Construction of various dikes and training structures in the tailwater below Kentucky Dam would have little or no impact upon flood heights even though these structures are located in areas of active conveyance. The total volume proposed for placement (including spillway training dikes, navigation training dike, and west-bank fishing jetties) is approximately 110,000 CY. Water surface elevations obtained from the 1:100 scale physical model constructed at the WES, before and after placement of the subject structures, show water surface elevation increases of no more than 0.3' under a wide range of TW elevations and discharges. Without the spillway training dikes, the maximum increases is 0.1'. The maximum increases were obtained for conditions with a low tailwater elevation and high discharge (100,000 cfs and TW elevation 306.3') and appear to be directly related to the incorporation of the spillway training dikes. Elevation differences for all other tailwater conditions analyzed were less than 0.2'. The TVA would have to approve this amount of rise in tailwater levels since they would be the only facility impacted in this reach. Numerical modeling of the effect of these dike structures is not considered necessary considering the ability to collect data directly from the physical model. Detailed evaluations of project impacts on flooding are included in Appendix B. The proposed action complies with Executive Order 11988 and KDOW Regulations.

5.6 River Navigation.

No Action. The No Action plan would result in improvements to overall navigation in the region with higher lock capacities provided but would not address the problems for upbound traffic entering the lock under some flow conditions. Recreational tailwater boating would still have to deal with the large west-bank eddy.

Proposed Action. The proposed plan would provide the same overall improvements with the higher lock capacity. The proposed navigation dike would permanently improve conditions for upbound traffic by reducing the size and strength of the eddy downstream of the powerhouse island. The spillway training dikes would permanently improve conditions for recreational boating by reducing the west-bank near-dam eddy. The

construction of the west-bank boat basin would allow safer launching and loading for recreational boating. Recreational boating would be negatively impacted by the presence of additional near-shore structures such as the navigation training dike and west bank fishing jetties. Signage is proposed for the navigation training dike to alert boaters of its presence extending off shore. These impacts to recreational boating would be minor.

5.7 Terrestrial Flora.

No Action. Under the No Action plan, per the 2000 EA and the 1992 FEIS, impacts to the vegetation of the project areas are expected to be inconsequential, with insignificant changes to the vegetation of the county, state, or region. There would be slightly more bank excavation downstream of the new lock.

Proposed Action. The proposed plan would result in additional losses of existing vegetation due to additional area impacted by the proposed changes to the lower haul road and expanded west bank boat basin. Most of the haul road area would be restored through seeding and landscaping to prevent erosion following completion of the construction activities. Some areas around the visitor use or lock operations facilities would be maintained in the future by mowing. In other areas, natural plant succession would be allowed to occur. The riparian corridor along Russell Creek would be protected from disposal activities to preserve the existing bottomland hardwood forest. Minor impacts may occur where this new access road crosses Russell Creek and in the area behind the pond dike.

To minimize impacts from the proposed action alternative, all unpaved lands would be stabilized with vegetation to reduce erosion after final grading. Compliance with the Kentucky storm water general permit for construction sites would be required for all contractors. In areas that will require maintenance, grasses and other suitable stabilization plants would be used. In order to revegetate unmaintained areas, native or non-invasive exotic species would be selected. In addition, preference would be given to species that would improve wildlife habitat and food sources. The Kentucky stream mitigation manual would be used to select desirable native or non-invasive exotic species for riparian areas.

Because no uncommon botanical communities or other noteworthy botanical areas occur in the project area and because the vegetation within the project area is common and representative of the region, the impacts to the terrestrial ecology of the county, state, and region are expected to be insignificant.

5.8 Terrestrial Fauna.

No Action. Potential effects of the No Action plan as per the 1992 FEIS and 2000 EA would result in loss of wildlife in the habitats surrounding the lock chamber and the relocated highway and railroad corridor. There would be a temporary displacement of wildlife in the disposal area and contractor staging areas.

Construction of the relocated highway and railroad embankments (approaches) were covered by the 2000 EA. The west bank impacts are 28 acres of forest and 14.5 acres of grass/fields. The forest impacts included 6.7 acres of forested wetland which are being mitigated for at a nearby wetland mitigation site. Other project related lands on the west bank are the west bank disposal area which is 9.6 acres of field and grass. It would be revegetated after use. A contractor staging area (shown on Figure 2 of the 2000 EA) is 13.6 acres of grass/field immediately below the dam. These impacts would be temporary and vegetation would be restored after use. The east bank highway and railroad approaches would displace wildlife from 19.8 acres of forest and 6.6 acres of field. This impact would be permanent. The relocated Walker Cemetery Road, already constructed, displaced wildlife from about 1.5 acres of forest and 1.5 acres of fields. More mobile species of wildlife would be displaced from these areas but would eventually move back into suitable habitats remaining in these areas.

The east bank contractor laydown area (9.9 acres) was evaluated in the 1992 EIS (see Figure 11 of FSEIS). This is a former disposal area from the original Kentucky Dam construction and contains successional trees. Since this area also contains archaeological sites, no ground disturbances would be allowed without detailed cultural resource surveys. This area is considered for use as a “last resort” for laydown purposes since it provides a quality buffer/cover for wildlife in the tailwater area. If used, wildlife would be temporarily displaced until the area is replanted with trees after uses.

The VDA is a former gravel processing facility (43 acres) and is of low quality for wildlife habitat. It is currently bare gravel or fields with some small trees adjacent to Russell Creek. A buffer would remain along the creek preserving the small trees. This area would be restored after use and remain in private ownership. The restoration plans are to use plants that are beneficial to wildlife.

Proposed Action. The Proposed Action plan would duplicate most of the terrestrial fauna impacts described for the No Action plan such as contractor staging and disposal areas and highway and railroad approaches. Additional land areas that have been evaluated in this FSEIS include the VDA Haul Road, additional areas associated with the new lock chamber, expansion of the west bank boat basin, and minor new parking areas on the Powerhouse Island and west bank. These modifications would result in the minor removal of additional upland habitats located in the vicinity of the lock chamber and VDA haul road. The haul road corridor would displace wildlife from 4.5 acres of forest and 1.5 acres of fields (under powerlines). These impacts would be temporary (up to eight years), with the original road to be restored after construction access to the VDA is no longer needed. The widened haul road shoulder is to be replanted with native vegetation at that time. Construction around the main lock chamber would displace wildlife from a wooded knob above the dam. This additional area that would be permanently impacted by the new lock excavation includes about 5.3 acres of forest and 2.7 acres of grassed areas. This area is currently a picnic/overlook area.

Waterfowl, wading birds and gulls around Kentucky Dam would not be affected by the project overall. Because no populations of uncommon wildlife are known from this area

and because of the abundance of similar habitat in the vicinity, modifications to the lock specifications and subsequent construction of the lock as proposed would not result in adverse impacts to terrestrial wildlife. There would be some temporary displacement of shoreline birds when some in-stream structures are being constructed such as fishing jetties, but they would return after construction. Bank excavations downstream of the new lock have been eliminated, except for some limited excavation near the cofferdam. Noise associated with construction activities would potentially result in disturbance to wading birds, waterfowl, and gulls in the immediate vicinity of the lock chamber. However, these impacts would be temporary and are not expected to result in adverse impacts to these birds which appear to be tolerate of the existing noise levels.

5.9 Threatened and Endangered Species.

Protected Plants.

No Action. The potential effect of the No Action plan (the Preferred Plan as described in the 1992 FEIS and in greater detail in the 2000 EA) would not pose additional impacts on protected Plant Species since construction activities that would take place have already been deemed “no effect” on Federally Listed species, and since no federal or state listed species occur in the area to be impacted.

Proposed Action. As stated in the section 4.9, no individuals of the federal listed plant Price’s potato bean (*Apios priceana*) or any federal or state listed plant species have been found within or adjacent to the newly proposed project areas. Thus these species would not be adversely affected by the proposed changes to the lock project as covered in this FSEIS and, therefore, no impacts to these species are anticipated as a result of the proposed action alternative.

Protected Fauna.

No Action. The No Action plan is the Preferred Plan as described in the 1992 FEIS and 2000 EA and would result in impacts described in the 2000 document. The proposed project would not result in adverse impacts to the gray bat, bald eagle, peregrine falcon or copperbelly watersnake. As determined in the 2000 EA and associated Biological Opinion, suitable habitat for Indiana bats may exist in the overall project area, however, construction of the lock would not jeopardize the continued existence of the endangered Indiana bat. By following the Reasonable and Prudent Measures (seasonal tree harvesting restrictions) incidental take is minimized and not likely to result in jeopardy to the continued existence of the Indiana bat.

Proposed Action. As proposed, modifications to the lock would not result in adverse impacts to any federal or state listed species of terrestrial animals. No populations of these species are known from the vicinity of the lock. The potential for impacts to Indiana bat habitat does exist because several small patches of upland forested habitat would be removed near the lock chamber. This area was surveyed during 1999 and no Indiana bats were captured at this site. Although this does not provide absolute proof that

Indiana bats are not in the vicinity, it does indicate that the area is not used extensively by the species. As stated in the 1999 BA, the habitat located at this site was considered marginal and not likely to support populations of Indiana bats. There are very few trees large enough to support colonies of Indiana bats at this site because an old camping facility exists in the affected area. Therefore modification of the lock design and ultimately the construction of the lock would not jeopardize the continued existence of the endangered Indiana bat. By following the Reasonable and Prudent Measures (seasonal tree harvesting restrictions) incidental take is minimized and not likely to result in jeopardy to the continued existence of the Indiana bat.

Protected Aquatic Species.

No Action. Potential effects of the construction and operation of the new lock on threatened and endangered species were presented in the 1992 FEIS and were addressed in a Biological Opinion issued by the U.S. Fish and Wildlife Service (USFWS) in March 1991. In 2000, the evaluation was updated to include new information about some of the species and to address components of the new highway bridge in the 2000 EA. Those revisions were addressed in a supplemental Biological Opinion issued by the USFWS in January 2000. The 1991 Opinion concluded that all features except the training dike “. . . are not likely to jeopardize the continued existence of the pink mucket or the orange-footed pearly mussels, provided that all protective measures presented in Section B of the 1991 Opinion are implemented and stringently enforced. However, construction of a training dike would likely have significant impacts on all of the listed mussel species that occur, or possibly occur, in the area.” The 2000 Supplemental Biological Opinion concluded that “. . . the relocation of the U.S. 62/641 bridge and approaches, as proposed, is not likely to jeopardize the continued existence of pink mucket pearly mussel, orange-footed pearly mussel, ring pink, or fanshell . . .”. The possible incidental take of endangered mussel species was addressed by requiring that Best Management Practices for sediment control be employed and inspected during all phases of the construction work.

Proposed Action. With regard to aquatic species, none of the proposed project modifications upstream from Kentucky Dam (including the proposed construction of the guidewall and approach channel dredging) would result in adverse effects to endangered or threatened species, in part because no federal or state listed aquatic species have been found or are likely to occur in that area. In addition, the requirement to use BMPs to control sedimentation would avoid any potential incidental take associated with the modifications proposed to occur in that area.

Downstream from Kentucky Dam, the multiple proposed project modifications would exclude considerable “in water work” tasks at several sites (e.g. previously approved dredging of a lower approach channel, dewatering of a large cofferdam area, and the construction of two new mooring cells) but would include in-water construction activity in several areas.

Information provided in the 1992 EIS and the 2000 EA, augmented by the results of the recent (April 2000) mussel survey at these potential construction sites, indicate that no members of any endangered mussel species have been encountered in recent years in the areas where these project features would be built. Two endangered mussel species (pink mucket and orange-footed pearly mussel), however, have been found within the last 15 years within the upstream part of the Kentucky Dam tailwater and still may be represented in good mussel habitats within the project areas by a very few individuals.

The potential effects of these activities on mussel resources (in general) are presented in the Aquatic Resources Section (5.3). As discussed in that section, results from earlier studies and the recent survey indicate that very few mussels (typically, less than one mussel per m²) occur in the specific areas where the training dikes, lock cofferdam, lower approach walls, fishing piers, boat basin, and boat ramps would be built. More mussels occur at least 30m offshore in the general area where the fishing jetties are proposed to be built; however, the potential impacts to those animals would be reduced by relocating mussels within the footprint of the jetties to other suitable habitats before construction. Results of the model studies and evaluations of the effects of the navigation training dike and spillway training dikes indicate these structures would result in only insignificant effects on the gravel and cobble substrate and the extensive mussel bed which exists along the east bank between the I-24 bridge and the new lock structures. The small numbers of mussels present where most of these activities would be built and the relocation of mussels from the limited areas where more animals are present indicates that none of these proposed activities are likely to adversely affect the few endangered mussels which might be present in this area. In addition, the requirement to use BMPs to control sedimentation on all construction sites would add further protection to avoid any potential incidental take associated with the proposed modifications to this project on endangered mussel species. These results lead to the conclusion that none of the proposed project modifications would have any adverse effect on endangered or threatened aquatic species.

Based on the anticipated lack of effects of the Proposed Action on listed species, reinitiation of formal consultation is not warranted. The USFWS concurred with this determination by a letter dated April 17, 2001 (copy in Appendix A, Item 8).

5.10 Natural Areas (Including Managed Recreation Areas).

No Action. As proposed under the No Action plan, portions of the P & L railroad and an access road would cross lands associated with the **Kentucky Dam Village State Resort Park**. The lands, located in the southeastern portion of the picnic area, are primarily wooded areas and do not contain picnic facilities. In addition, a public restroom facility located along the loop road, would be closed during construction of the highway and railroad bridges. Increased noise levels as a result of traffic and other activities associated with construction, would temporarily diminish the quality of the outdoor experience for the user. Therefore, no significant impacts to the Kentucky Dam Village State Resort Park are anticipated as a result of the proposed action. In the 2000 EA, refer

to the August 5, 1999 letter from the Kentucky Department of Parks supporting the use of State Parks lands for the relocation of transportation facilities.

Noise associated with construction activities would result in temporary disturbance to wading birds, waterfowl, and gulls in the vicinity of Kentucky Dam. The area has relatively high noise levels now and wildlife is tolerant of the existing levels. The proposed project is not expected to negatively impact any of these species permanently. Therefore, impacts to the wildlife viewing at **Kentucky Dam Nongame Wildlife Observation Area** are expected to be temporary and insignificant.

The proposed relocation routes of the P & L railroad and U.S. 62/641 cross the Tennessee River below Kentucky Dam. As stated in the Affected Environment Section, this area is a designated **Mussel Sanctuary** and **Outstanding Resource Water**. If Best Management Practices are followed during construction so that little sediment and/or other materials reach the river channel below Kentucky Dam, and if commitments concerning mussel habitat found in the Protected Aquatic Species section of this document are followed, impacts to these areas are expected to be insignificant.

Under the No Action plan, **Taylor Park Campground** would be used for equipment storage, contractor staging, and other related construction activities. During this time the campground would be closed. As mitigation, under the No Action plan, would have required a campground be developed at a presently undetermined location on Kentucky Reservoir. After the project is complete, a portion of TPC, mainly the restroom and a small picnic area, would be reopened.

As discussed in the Affected Environment Section (4.10), additional natural areas are known to occur near Kentucky Dam. However, because of their distance from the proposed project, no impacts to these areas are anticipated.

Proposed Action. Under the Proposed Action plan, portions of the P & L Railroad and an access road would cross lands associated with the **Kentucky Dam Village State Resort Park**. The lands, located in the southeastern portion of the picnic area, are primarily wooded areas and do not contain picnic facilities. In addition, a public restroom facility located along the loop road, would be closed during construction of the highway and railroad bridges. Increased noise levels as a result of traffic and other activities associated with construction, would temporarily diminish the quality of the outdoor experience for the user. A new boat ramp, parking area, and restroom would be constructed on TVA lands leased to the state park at the expanded boat basin. Two fishing jetties and paved parking would be constructed on TVA lands leased to the State Park downstream of the existing ramp. Therefore, no significant impacts to the Kentucky Dam Village State Resort Park are anticipated as a result of the proposed action. After completion of the project, additional recreational facilities would be available for public use.

Noise associated with construction activities would temporarily diminish the wildlife viewing opportunities in the **Kentucky Dam Nongame Wildlife Natural Area**. Once

construction activities are complete, wildlife viewing opportunities would return to their present levels. After relocation of the highway to the new downstream bridge, improved conditions for wildlife viewing would result from the separation of commercial and tourist traffic. The new pedestrian/bicycle bridge would also provide better viewing opportunities. Therefore, no significant impacts to the wildlife observation opportunities at Kentucky Dam Nongame Wildlife Natural Area are anticipated as a result of the Action Alternative.

The proposed relocation route of the P & L Railroad and U.S. 62/641 would cross the Tennessee River below Kentucky Dam. As stated in the Affected Environment Section (4.10), this area is a designated **Mussel Sanctuary** and **Outstanding Resource Water**. If Best Management Practices are followed during construction so that minimal sediment and/or other materials reach the river channel below Kentucky Dam, and with commitments for mussel relocation found in the Protected Aquatic Species section, impacts to these areas are expected to be insignificant.

Taylor Park Campground (TPC) would be used for storage and staging under the Action Alternative. Fill dirt would be placed on the lower level of TPC to an elevation of 385' (within and above the maximum pool level of 375') to reduce inundation of the area. Most of the fill would eventually be removed from the campground and used as back-fill at the lock facility. TVA has since closed TPC directing the public to other campground facilities on and/or near Kentucky Reservoir Reservation. Under the Proposed Action Alternative, mitigation efforts would focus on enhancing fishing opportunities by constructing a pier on the west side of the powerhouse island and on the west bank of the Tennessee River and improving the railing on the existing coffer cell. In addition, construction of a visitors center at Kentucky Lock, creation of additional parking, and construction of restroom facilities on the powerhouse island are also planned.

As discussed in the Affected Environment Section, additional natural areas are known to occur near Kentucky Dam. However, because of their distance from the proposed project, no impacts to these areas are anticipated as a result of the associated actions.

5.11 Recreation.

No Action. The No Action plan would result in only insignificant, short term and/or minor impacts all of which have been described in the 1992 FEIS. The existing east bank boat ramp would be closed and mitigated by an enlarged existing west bank boat ramp. In reality, this ramp closure does not impact many users since this ramp is in poor condition and rarely used. The Taylor Park campground would be relocated to another location.

Proposed Action. Since the 1992 FEIS, a decision to not develop a new reservoir campground in lieu of the closed Taylor Park campground has been made. This decision was based on customer occupancy and use patterns. The public and agency scoping process identified additional facilities as being needed. The east bank boat ramp would still be permanently closed as a result of project activities due to safety concerns with its

location below the navigation approach channel. With public input and discussions between TVA, KDFWR and the Corps of Engineers, a listing of proposed recreational facilities was developed to mitigate for the loss of the campground. This listing includes: a new lock visitors building; powerhouse island improvements that include parking expansion, restroom facilities, improvements to the railing of the coffer cell, and a fishing pier; and west bank downstream improvements that include a fishing pier. Fishing pier elevations for the powerhouse island and west bank locations are proposed at 318' msl and 310' msl, respectively. This would provide a range of fishing opportunities at various tailwater levels.

It is important to note that budget limitations might determine whether all the above facilities are constructed. Funding is limited to the relocation costs for the campground and final construction costs are being refined. If funding does limit which facilities are constructed, then the previously mentioned agencies would prioritize facilities based on costs and preferences. The intent of this FSEIS is to evaluate potential impacts should all the facilities be constructed.

The current plan for mitigation of the closure of the east bank boat ramp is to build a new, two-lane ramp with courtesy dock just upstream of the existing west bank ramp. The new ramp would be located in an expanded boat basin. New restroom facilities and parking improvements would be convenient to the new ramp.

Construction activities on the west bank would close bank fishing and access to the area upstream of the boat basin for several years. As mitigation for the bank closure, the proposed alternative includes plans for two new fishing jetties to improve the area available for bank fishing and extension of the existing boat ramp.

The construction of the proposed spillway training dikes would address conditions of the near-dam west bank eddy. By reducing this eddy size and strength, recreational boating conditions would be improved and rescue time for stalled boaters increased. Construction of these structures would require short-term localized restriction to boating in the immediate area.

Use of Taylor Park campground as a contractor staging area did not change from the 1992 documents. However, use of the lower level of the campground as a permanent disposal area was added. With the proximity of Vulcan Materials on the right bank upstream of the lock, having this small area restored for public use after project construction is desirable as a buffer. Possible informal uses include bank fishing, reservoir overlook, and trails. The final configuration of this area is to be determined by TVA after construction activities are completed.

Impacts to public recreation facilities caused by project construction are many and varied. Public use of the tailwater fishery will be temporarily impacted during the construction period in many areas. However, mitigation measures are proposed to offset these impacts. After construction of the lock, the long-range impacts would be positive. If the

spillway training dikes are constructed, this would be a significant improvement for recreational boating.

5.12 Visual and Aesthetic Resources.

No Action. The No Action plan would result in visual impacts in the immediate area of the new lock and on the west bank in the area of bridge relocations (common to both plans). Turbidity-generating activities would result from the in-stream activity associated with the No Action plan for the new lock and approach channels. Around the new lock, more area (compared to Proposed Action) would be disturbed by construction due to the greater area dewatered behind the cofferdam. More upstream and downstream approach channel excavation would result from the lock location being shifted landward (20 feet) and downstream (200 feet). The downstream channel would be widened along the right margin to the Interstate 24 Bridge. A portion of the excavated volume would be disposed of at the aquatic disposal area at TRM 19.7 or to line the bank from Russell Creek to the interstate. The additional in-stream activity in and around the lock would result in more short-term visual and aesthetic impacts such as turbidity. The east bank boat ramp would be closed and mitigated on the west bank by upgrading the existing ramp.

Other areas would remain unchanged under the No Action plan. The access road to the Vulcan Disposal Area would not be widened, however, this would shift haul traffic (and associated visual impacts) to public roads. Structures such as the navigation training dike, spillway training dikes, Lock Visitors Center and west bank fishing jetties would not be constructed. This would reduce short-term visual impacts from these localized areas.

An alternative site for the Taylor Park Campground would be required as mitigation for the closure and use of this area during construction. The original TPC would be unchanged and available for use after construction.

Proposed Action.

Access Road to Vulcan Disposal Area. A more open visual landscape would be evident to the trail user following construction. It is recommended that a combination of wildflower seeding adjacent to meadow areas and a native tree seed mix be used along the wooded stretches of the restored trail shoulder. A 285-foot section of a tributary stream would be relocated to avoid affecting the existing pond and dike on Russell Creek. Over time, the relocated channel would become reestablished with native trees such as black willow. With the trails repaved with a 14-foot asphalt surface and the revegetation of its shoulders, any negative impacts created by this proposal would be temporary and insignificant.

Taylor Park Campground Use and Mitigation. All of the proposed mitigative actions would have positive visual effects for the visiting public and fishermen as well as employees working onsite.

- A new lock visitor's center would afford overall views of both locks, as well as providing interpretive space for exhibits.
- A fishing pier located on the west bank of Powerhouse Island under the new Highway 62 bridge would provide the public with ADA accessible fishing and viewing of the tailwater area. The additional parking would be adjacent to this facility partially located under the new Highway 62 bridge.
- A much needed restroom facility to be located along an existing walkway on Powerhouse Island would be built of similar materials as the new power warehouse located in the adjacent switchyard. This would provide an upgraded facility more centrally located to public activity.
- A new railing on the coffer cell would have positive visual effects from both a safety standpoint and from one of aesthetics.
- A fishing pier to be constructed on the west bank would provide both ADA access and a new viewing vantage point for the public. Its location under the new Highway 62 bridge would provide both partial shade and rain protection to users.

Use of the TPC area for stockpiling or as permanent disposal would necessitate the removal of most or all of the existing tree cover. Replanting of the area following lock construction would be necessary for the area to provide the public with a day use/picnic area. If the existing elevation of this lower level is raised, a better view of Kentucky Lake and the lock approach would likely result. The Vulcan barge loading area would also be more visible until vegetative screening is established.

East Bank Boat Ramp Closure Mitigation (Contractor Use). The enlarging of the west bank boat basin would remove both the existing vegetation and the concrete walk. The enlargement of the west bank boat basin for contractor access would temporarily close the area to the public during construction. After use for contractor access, positive long-term visual effects would result as a new launching ramp with courtesy dock and restrooms are provided for the public. Visual impacts resulting from this activity would be temporary and would blend with the other construction taking place on the project. Long-term impacts would be beneficial with improved public boating and fishing facilities.

Upstream Lock Approach Walls and Channel. The proposed action with the use of a floating guidewall would greatly reduce the area permanently covered by lock features. Sediment generated by construction activity would be less with the reduced in-stream construction activity and would likewise reduce negative visual impacts as seen by lake users. Additionally, construction activities would be temporary in nature.

Downstream Lock Cofferdam, Approach Walls, Access Ramp and Approach Channel. Design changes have lessened the degree of instream activity required to construct the downstream lock features. Turbidity would be decreased, lessening visual impacts to water clarity as seen by tailwater users.

Navigation Training Dike. Visual effects resulting from the construction of this dike would be positive for both tailwater fishermen, who would have an expanded area and

facility from which to fish, as well as for locking traffic which would experience less difficult currents in approaching and departing the lock. Some construction impacts would be minor but negative with turbidity resulting from the dike construction. The use of clean rock material should minimize turbidity levels.

Mitigation for West Bank Closures During Construction. Closure of portions of the west bank would create a temporary loss of tailwater and dam viewing area to the public. Mitigation of additional parking and fisherman jetty construction would be available for fisherman use and the viewing public during construction and long term after project completion. An overall positive visual effect would be experienced by both fishermen and visitors.

5.13 Historic and Cultural Resources.

No Action. The No Action plan would affect an eligible National Register site, Kentucky Lock and Dam (L&D). The two archeological sites (15Lv204 and 15 Lv24) within the general area and are away from the lands affected by the lock project. As described in the 1992 EIS, site 15Lv204 is considered the same site as 15Lv22 for the purposes of the FSEIS. The sites are on the opposite (north) side of Russell Creek from any project-affected lands. For site 15Lv12, the protective layer of fill is to be undisturbed unless prior cultural resource investigations are performed. Currently, the area is approved for use as a laydown/staging area only. The implications of this effect are discussed in the 1992 EIS and are subject to stipulations contained within a Memorandum of Agreement (MOA) executed in 1992 pursuant to the requirements of Section 106 of the National Historic Preservation Act. On-going documentation studies would serve to mitigate any adverse effects to Kentucky L & D. Additional lands would be affected for the highway approaches; however, no cultural sites are known on these properties.

Proposed Action. Site 15Lv12 is also separated from the proposed VDA Haul Road by a berm remaining from the original Kentucky Dam construction activities. This berm is to be undisturbed during construction of the VDA Haul Road. Most of the proposed features do not affect the original L&D. Construction of the new visitors center building would be a modification to the original L&D. Since the proposed action would have some effect on Kentucky L&D, ongoing documentation studies would serve to mitigate any adverse effects in accordance with the stipulations of the MOA.

5.14 Socioeconomics.

No-Action. Under the No Action plan, construction and operations would be as discussed in the 1992 FEIS) and the 2000 EA. Socioeconomic impacts would result from the construction activity as described for the No Action plan. Construction for the main lock chamber area would include a larger downstream dewatered area and the larger bank and channel excavations and associated aquatic disposal. Therefore, there would be no significant impacts attributable to choosing this alternative.

Proposed Action. Under this alternative, there would be various changes in and additions to construction activities for the Kentucky Lock Project. Additional employment would result from such activities as haul road widening, building new features such as Lock Visitors Center, expanded boat basin and new boat ramp, fishing piers and jetties, and navigation training dike (and possible spillway training dike). On the other hand, certain other changes, such as shortening of the downstream cofferdam and minimization of upstream approach excavation, likely would result in small decreases in total employment. While the net result might be an increase in overall employment and income, the result probably would be only small changes in total employment, in peak employment, and in the total payroll associated with the project. Any increase in impacts on community services and housing would be small unless activities generating additional employment are scheduled to coincide with peak construction of the lock itself. Therefore, no important impacts from construction are expected. Projected total employment numbers range from 79 to 624 with the peak occurring in the year 2004. Tables 6-8 list direct, indirect, and total employment projections through the construction of the project.

Operation of the lock would be essentially the same with these changes; therefore, there would be no important operational impacts. The closing of Taylor Park Campground and relocation of the east bank boat ramp could have some minor impact on recreation, as discussed in that section, but since the impacted recreation is generally local and the impact itself would be small there would be no noticeable impact on income and employment in the area.

5.15 Environmental Justice.

No-Action. For the No Action plan, construction and operations would be as stated in the 2000 EA. Therefore, there would be no disproportionate environmental justice impacts attributable to choosing this alternative.

Proposed Action. Since any changes in construction activity would be small, the disadvantaged populations in the immediate area are very small, and the construction activities would be in or adjacent to areas already in use for the lock and dam or for navigation purposes, no disproportionate impacts to disadvantaged populations are anticipated. Benefits from employment during construction would be available without discrimination. Since there would be no difference in operation as a result of the proposed changes in construction activity, there would be no disproportionate impacts to disadvantaged populations. Impacts on recreation would be minimal, as discussed in the recreation section and should not disproportionately impact disadvantaged populations.

5.16 Cumulative Effects.

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the (proposed) action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes

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such other actions (40 CFR 1508.7)”. CEQ guidance identifies an 11-step process for evaluating cumulative effects. For the purposes of cumulative effects the entire Kentucky Lock Addition project is considered, not just the changes covered by this FSEIS.

Step 1: Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals. The assessment goals can be defined as “what resources is the proposed action going to affect”. Effects can result from either direct-project related, indirect- project related, and independent indirect causes. Based on the public and agency scoping and review performed for the three NEPA documents conducted for this project, the following resources have been identified as target resources within the assessment goals: river navigation, mussels, fisheries, wetlands, and recreation/tourism.

Step 2: Establish the geographic scope for the analysis (project impact zone). This includes areas impacted by the construction of the new lock, which is considered regional in scope. The project impact zone includes the Cumberland (lower 32.6 miles) and Tennessee River (R.M. 2.3-25.4) systems from the Kentucky – Barkley Canal downstream to their navigation connection to the Ohio River. The following counties are included in the analysis: Livingston, Marshall, Lyon, and McCracken.

Step 3: Establish the time frame for the analysis. Past impacts will be considered back until just prior to construction of Kentucky Lock and Dam in 1947. Present conditions are the baseline conditions as described in Chapter 3 of the FSEIS. Future conditions are projections for 50 years into the future (project design life). The river systems were much different prior to the construction of the two dams, with river navigation provided by low head L&Ds with little storage. With the construction of Kentucky Dam and later Barkley Dam, the headwaters were converted to lacustrine conditions. The tailwaters remained riverine, but were altered over time by the reduction in sediment bed load and the addition of hydropower generation. River navigation has increased over time with the construction of the L&D network in both river systems, as well as local barge loading facilities. The surrounding land uses have gradually changed from primarily agricultural to a more mixed agriculture, suburban, and forested land uses. The Calvert City area developed into an industrial complex in the 1970 and 1980’s.

The present or baseline conditions are described in detail in Chapter 3. River navigation is currently limited during periods of high traffic flow at Kentucky Dam by locking delays. As delays increase, more river traffic shifts to the longer and narrower Cumberland route.

Future conditions will be similar to baseline with a gradual increase in population of the region. Residential development in the areas adjacent to the lakes will likely grow at a faster rate with construction of recreational second-homes. River navigation would gradually increase over time.

Step 4: Identify other actions affecting the resources, ecosystems, and human communities of concern. The project impact area is affected by a variety of inter-related factors such as upstream land use changes, population trends and resulting point and non-point pollution loads. Socioeconomic conditions include the demand for products transported by the river system and transportation costs for river traffic versus alternative modes of transport. Recreation use is impacted by general economic conditions with more tourism dollars available during good economic times. Recreation quality is affected by the availability of adequate facilities. Regulatory programs set standards to protect water quality criteria for the designated uses of the rivers and limit point source discharges. Wetland losses are limited by regulatory/mitigation thresholds. Many nonpoint sources are controlled by voluntary BMP programs. The construction of dams has altered the sediment bed transport that affects many aquatic resources such as mussels and fish spawning. Riverine habitat was converted to lacustrine habitat in the headwaters.

Step 5: Characterize the resources, ecosystems and human communities in terms of their responses to change and capacity to withstand stresses. River navigation is currently restricted during periods of high use by the Kentucky Lock. Recreation resources are generally available but may be less attractive during high use (holiday) periods due to crowding. Mussels are protected within the designated sanctuaries and populations appear to be doing well within these reaches. Downstream of the Tennessee River sanctuary, mussel populations are lower than in the sanctuary. In impounded areas, a few mussel species are favored over those that require riverine habitat. Wetlands have been gradually decreasing over time, due to draining and filling, however; regulatory programs are now requiring mitigation for all but small increments (below Nationwide thresholds) in an effort to achieve “no net loss” of wetlands. Fisheries in the area are highly productive and appear to be relatively stable.

Step 6: Characterize stresses affecting these resources, ecosystems and human communities. Stresses impacting river navigation include economic demands for commodities and delays at some locks. Fisheries and mussels are stressed by water quality and aquatic habitat conditions, although the current resources appear to have adjusted to modified habitat conditions. Competition from exotic species (zebra mussels) can stress native mussels, although zebra mussel populations do not appear to have reached problematic levels. Gas supersaturation levels stress fisheries in the immediate Kentucky tailwaters under some flood gate operations, although this problem has been minimized in recent years. Wetlands are stressed by land use changes where wetlands are converted to other uses and by water quality conditions in and above the wetland areas.

Step 7: Define a baseline condition for the resources, ecosystems and communities: Chapter 3 provides detailed descriptions of the resources. In 1998, traffic tonnage passing through Kentucky Lock was nearly 36,000 thousand tons and delays averaging 6 hours can occur at the lock. Mussel populations appear to be doing well in the lower Cumberland and Tennessee Rivers, especially in the Tennessee River sanctuary. Fisheries also appear to be very productive in the project impact area with the Kentucky

Dam tailwater popularity rivaling that of the Kentucky portion of Kentucky Lake for anglers. Wetland resources are stable in the region with the current regulatory controls and mitigation requirements. Recreation uses are very important to the local economy, however, the need for additional tailwater fishing and tourist facilities has been recognized. Ample campground facilities are available. Socioeconomics in the region have been steady with gradual growth around the Paducah area and recreational second homes in the area of the lakes.

Step 8: Identify the important cause and effect relationships between human activities and resources, ecosystems, and human communities. Socioeconomic considerations drive river navigation, including the demand for barge-transported products and fuel costs. Mussels are impacted by water quality and substrate conditions. They generally require suitable gravel and cobble substrate for habitat and the presence of appropriate fish hosts for their reproductive cycle and food sources. Fisheries require suitable water quality conditions. Wetlands are effected by the demand of land for uses such as agriculture or residential development and water quality conditions draining into the wetland areas. Recreation is effected by socioeconomic factors (dollars available to spend) and the availability of recreational facilities.

Step 9: Determine the magnitude and significance of cumulative effects. River navigation is important to the regional economy of the western Kentucky area as well as the Nation as a whole. Recreation is also significant to the local economy as tourism contributes to the economy of the lake area. The fisheries of the area are described as the most productive in Kentucky. The mussels are very significant from both a regional (population) and national standpoint (from the presence of Federal listed species). Wetlands are significant on the national scale due a number of functions they perform.

Step 10: Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects. In the development of the navigation and spillway training dikes, a physical model was utilized to evaluate designs to address the river (eddy) conditions while minimizing or avoiding environmental concerns. A major consideration was to provide similar flows and velocities at the high quality downstream mussel beds. The size of the structures was minimized and mussel relocation is proposed from the footprints of structures such as the bridge piers and fishing jetties. The affected areas were surveyed to determine the quality and significance of existing mussel resources. Only common species were found. Wetland mitigation is being performed to replace the 7 acres impacted by the project with 15.1 acres of restored wetland and 9 acres of existing wetlands. Recreation impacts include closure of areas to bank fishing and the closure of a TVA campground. These impacts have been mitigated in consultation with state agencies, as described in the FSEIS. This mitigation will provide additional long-term recreational facilities that are currently needed in the area. Impacts to fisheries would be avoided by complying with seasonal restriction on in-stream activities to protect fish spawning beds.

Step 11: Monitor the cumulative effects of the selected alternative and adapt management. The proposed Kentucky Lock Addition Project would produce significant

positive impacts on river navigation and recreational resources in the project impact area, along with minor improvements in fisheries habitat and mussel habitat. River navigation would be improved by the additional capacity of the new lock and the navigation training dike that would improve navigation conditions for upbound traffic. This should result in less congestion in the lower Tennessee River and less barge traffic waiting for lock passage in areas containing high quality mussel beds. There would be a shift of some traffic from the lower Cumberland to the lower Tennessee once the lock delays are reduced, with an overall increase in traffic on both systems over the life of the project. Cumulative effects on wetland would not be significant. The construction of the spillway training dikes, navigation training dikes, and fishing jetties would produce some minor but positive cumulative effects on fisheries and mussel habitat due to reduce scouring and improved structure. Certain resources will be monitored during and after construction to ensure these resources remain in desirable condition. If monitoring reveals unanticipated impacts, these will be evaluated and corrective actions implemented.

5.17 Unavoidable Adverse Effects

Both plans would have similar adverse impacts for many features such as the disposal area and new lock chamber and west bank closure to the public. Short-term impacts are construction related and long-term are more operation related. Potential fish kills from blasting would be realized for both plans in the lock chamber area.

No Action. Short-term impacts on water quality and local aquatic resources would be worsened with the additional bank and channel excavation and downstream aquatic disposal area. Short-term traffic impacts would be worse with all the haul truck traffic traveling over public roads to the VDA. Long-term impacts would be worse for river navigation for commercial traffic entering the lock from the downstream side and for recreational craft near the dam. Long-term aquatic habitat improvements in the downstream disposal site would be improved since the rock was intended to stabilize an eroding shore.

Proposed Action. Short-term impacts would be slightly greater with the additional land areas disturbed by the VDA Access Road, filling in the lower TPC, and expanded west bank boat basin until these areas are stabilized. Short-term water quality and displacement of benthic life would be greater during and immediately after construction of the fishing jetties, training dikes, and dredging for access ramp. Mussel relocation would minimize construction impacts. Long-term floodplain impacts would be minor but negative with the additional fill placement. Other long-term adverse impacts would be similar to or less than the No Action Plan.

5.18 Short-Term Uses and Long-Term Productivity

No Action. The No Action Plan would require closure of much of the tailwater area and west bank during construction.

Proposed Action. The Proposed Plan would slightly increase the areas closed during construction to include the west-bank boat basin and existing west bank ramp (for up to one month). The expanded boat basin would be used by lock contractors throughout the active construction period. Long-term improvements would be provided for river navigation after construction of the two dike systems. The dikes and fishing jetties would slightly improve long-term aquatic habitat due to the additional structure. Long-term improvements in tailwater recreational uses would be provided with the expanded boat basin, additional boat launching facility, fishing piers, fishing jetties, and improvement of the existing ramp.

5.19 Irreversible and Irrecoverable Resources Commitments

No Action. The economic, energy resources, and raw materials required to construct the No Action plan would be permanently lost. In general, these resources would be greater (i.e. lock construction costs are higher) with this plan. For example, haul cost would be greater without fill placement in the TPC and without the lower access road to the VDA. Guidewall construction costs would also be higher.

Proposed Action. Most of the design refinements in the lock chamber have resulted in lower construction costs (energy resources, and raw materials) over the previous plan. Some additional features, such as training dikes, that have been added would increase overall costs of the proposed action plan. If suitable, rock excavated as part of the lock addition project would be used for construction of the navigation or spillway training dikes. Features that have been added for mitigation purposes would have been common to both plans, even though they are only now being proposed. Floodplain functions would be slightly more negative with additional fill placement, but this is offset by reductions in construction costs.

Chapter 6 – Environmental Commitments

6.1 Avoidance

Actions taken during the design and future construction of the Proposed Action plan include the practices discussed in this paragraph. All bottom-disturbing activity, including blasting, dredging, and fill placement would be prohibited during fish spawning periods listed in the previous water quality certification. For the tailwater, this seasonal restriction is during February and March. For the headwater, the restricted period is mid-April to Mid-June. An exception was granted for the construction of the relocated bridge piers. The existing “protective” layer of fill at archeological site 15Lv12 would remain unmodified. The berm separating site 15Lv12 from the VDA Haul Road is also to remain undisturbed.

6.2 Minimization

Several design considerations were considered to minimize potential environmental impacts. In-stream structures were located to avoid higher densities of mussel populations. Mussel relocation efforts are proposed where warranted to reduce impacts that would result from construction of these structures. This includes the fishing jetties, training dikes, access ramp dredging areas, and the navigation channel excavations. Diver safety will be a consideration in the relocation efforts.

Contractors would be responsible for fish kill damages/fines incurred for whatever reason. For example, blasting contractors will be encouraged to minimize fish kills by using smaller charges, bubble screens, or scare blasts.

Contractors are required to submit an Environmental Protection Plan to the Corps before construction activity begins. Included in this plan are contractor’s methods for compliance with the KPDES general permit for storm water point sources (erosion controls and stabilization procedures) and spill response. Containment equipment is to be provided to address the amount of potential spill present. Also, fuel storage is to be away from water and bermed or otherwise protected. Diver Safety Plans are to be compliant with Corps standards.

To protect the general public, active construction areas are to be cordoned off to prevent access by the public. This would include the west bank above the existing boat basin. This would include localized areas of the river and lake during active construction of in-stream features. To protect both construction crews and traffic entering/exiting the lock, escort tugs will be required during active construction of the lock guidewalls and approach dredging.

Construction sequencing is intended to minimize some project impacts. The west bank fishing jetties would be constructed early to offset impacts from closing areas of the west bank upstream of the boat basin to public access.

6.3 Compensatory Mitigation

Several mitigation features have been considered in the Proposed Plan to address construction impacts.

For closure of the west bank to bank fishermen, two fishing jetties would be constructed early in the project downstream of the existing boat ramp. The existing ramp would be improved by adding an end-section. The design of these jetties was coordinated with TVA, KDFWR and Kentucky Department of Parks to develop an effective design.

For closure and use of the TPC, two fishing piers, new Lock Visitor's Center, improved railing on the eastern-most existing coffer cell, and additional Powerhouse Island parking and rest rooms would be constructed within the budget limitations of the TPC closure. The design of the fishing piers was coordinated with KDFWR and TVA to develop a design that provides fishing access while minimizing maintenance concerns and closure periods due to inundation.

ADA compliant ramps and design would be provided for the rest rooms, additional parking, two fishing piers and one west-bank jetty.

Wetland mitigation for the entire Lock Addition Project, including the 0.11 acres associated with the VDA Haul Road, is being accomplished at a nearby mitigation site in Benton, Kentucky as discussed in the 2000 EA. The mitigation site has been purchased by TVA and a Wetland Mitigation Plan has been developed. A copy of this plan is included in this FSEIS in Appendix B (Item 7). Construction activities on the mitigation site should be on-going in late summer 2001 and the site should be planted this calendar year.

6.4 Monitoring

Monitoring of construction activities would be a critical control during lock construction for both contractor and Corps inspectors. Each contractor must submit an Environmental Protection Plan that defines methods to be used based on activities to be performed. Inspections of erosion control and stabilization effectiveness are to be done in accordance with the KPDES storm water permit. For in-stream activity, visual turbidity monitoring is to be provided to insure that objectionable turbidity is not generated by the activity. A turbidity curtain would be used during excavation of the west bank boat basin. If unexpected cultural resources are encountered, work is to stop until the site is investigated by a qualified archeologist. Likewise, if suspicious materials that exhibit potentially hazardous characteristics (sheens, odors, etc.) are encountered, work is to stop until the material is identified and its potential risks to workers and the environment addressed.

The wetland mitigation site would be monitored to ensure successful restoration of the hydrology and establishment of wetland vegetation. The site is to mitigate for the loss of palustrine forested wetland.

Chapter 7 – Compliance With Environmental Laws, Statues and Executive Orders

The various acts, laws and regulations, and executive orders have been considered in the development of this FSEIS and project design. For each item, a brief summary of the purpose, applicability or scope, and compliance status are provided.

NEPA - The purpose is disclosure of impacts of the proposed action. A Record of Decision (ROD) required from TVA and Corps after completion of the Final SEIS. On-going compliance.

Clean Water Act – Section 404 (b)(1) evaluation has been performed and a Public Notice of Activities regulated under Section 404 was be issued concurrent with the comment period for the DSEIS. The Corps has requested modification of the existing 401 Water Quality Certification. This is required before a Record of Decision is signed. **TVA 26A Permit** - for land use changes and floodplain impacts.

Section 7 of Endangered Species Act (ESA) - Refer to USFWS Letter in Appendix A, Item 8. The January, 2000 Biological Opinion remains in effect. This BO adequately addresses features in this FSEIS and the requirements of Section 7 of the ESA have been fulfilled.

Fish and Wildlife Coordination Act (FWCA) - A supplemental FWCA Report is being prepared by the USFWS, in coordination with the KDFWR. This report will be required before the ROD is signed. The ROD would document any changes to the FSEIS resulting from this report.

Executive Order #11988, Flood Plain Management, (Full compliance).

Executive Order #12898, Environmental Justice, (Full compliance).

Executive Order #11990, Protection of Wetlands, (Full compliance).

Kentucky Demolition Landfill Permit (< 1 acres site) – to be obtained prior to use of the construction/demolition debris landfill.

Section 106 of National Historic Preservation Act. Compliance with existing MOA to be maintained.

Section 504 of the Rehabilitation Act of 1973 and Architectural Barriers Act of 1968 (comparable to complying with the American With Disabilities Act of 1990). (Full compliance)

Chapter 8 – Supporting Information

8.1 List of Preparers This FSEIS was prepared by staff from the Corps and TVA. In addition, supporting design information was prepared by contractors for the Corps. Listed below are the primary preparers of this SEIS document. This document received an independent technical review by Corps and TVA staff that are not part of the project team and revisions were made based on that review.

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8.2 Index

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9.0 Public and Agency Consultation for FSEIS

The FSEIS is being distributed to various agencies and interested public (Transmittal list follows). Agencies to receive copies include the Kentucky Clearinghouse Review, KDOW, KDFWR, USFWS, USCG and EPA. The FSEIS will be filed with EPA and a notice in the Federal Register will be filed by EPA. In addition, the Corps of Engineers will distribute a Public Notice in the lock region announcing the availability of the FSEIS for review (mailing list follows). A minimum 30-day wait period (from the date of the EPA notice) will be allowed for submission of comments on the FSEIS before a Record of Decision (ROD) can be signed. Modification of the existing 401 water quality certification will be required from the KDOW before the ROD is signed. A Supplemental Fish and Wildlife Coordination Act Report will be required from the USFWS, with input from the KDFWR before the ROD is signed. Resolution of EPA concerns is required before the ROD is signed. After completion of the 30 day wait period, the FSEIS will be revised to address comments, as needed. If issues are adequately resolved and documented in the Final SEIS, a ROD would then be signed and filed with EPA by both TVA and the Corps.

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