



REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY**  
**NASHVILLE DISTRICT, CORPS OF ENGINEERS**  
**3701 BELL ROAD**  
**NASHVILLE, TENNESSEE 37214**

November 18, 2014

Regulatory Branch

SUBJECT: File No. LRN-2011-00103; Proposed Bridge Replacement; Cumberland River Mile 64.0, Lake Barkley, Trigg County, Kentucky (Latitude: 36.80041; Longitude: -87.97957)

Kentucky Transportation Cabinet  
Department of Highways  
200 Mero Street  
Frankfort, KY 40622

Dear Mr. Roy Collins III:

This refers to your application requesting a Department of the Army (DA) permit for the proposed permanent placement of fill material into waters of the United States, including navigable waters and ephemeral streams, for new bridge construction at Lake Barkley on US 68/KY 80 highway on the Cumberland River in Trigg County, Kentucky. Please refer to File Number LRN-2011-00103 in reference to this project.

In accordance with Section 10 of the Rivers of Harbors Act (33 USC 403), this Letter of Permission (LOP) authorizes you to construct a four-lane, 3,805' long span bridge immediately north (downstream) of the existing Henry R. Lawrence Bridge, fill approximately 750 linear feet of ephemeral stream channel, and dredge approximately 40,000 cubic yards of material from approximately 13.3-acres of lake bottom. The construction of the bridge includes the permanent placement of fill within 0.92 acres of Lake Barkley, installation of fish attractors, and 2,097 linear feet of levee stabilization. In addition, the existing Henry R. Lawrence Bridge will be demolished and removed to a depth at or below elevation 330'.

This work must be constructed as shown on the attached plans and is subject to all conditions attached to this permit. The work is authorized until November 18, 2019. If the work is not completed by that date, you should contact this office to obtain confirmation that the permit is still valid.

If you object to this decision, you may request an administrative appeal under U.S. Army Corps of Engineers (USACE) regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeals Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this decision you must submit a completed RFA form to the Great Lakes and Ohio River Division, Division Office at the following address:

LRD Appeals Officer  
U.S. Army Corps of Engineers  
Great Lakes and Ohio River Division  
550 Main Street, Room 10032  
Cincinnati, OH 45202-3222

TEL (513) 684-6212; FAX (513) 684-2460

In order for an RFA to be accepted by the USACE, the USACE must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by January 17, 2014. **It is not necessary to submit an RFA form to the Division Office if you do not object to the decision in this letter.**

If changes in the location or plans of the work are necessary, revised plans shall be submitted promptly to this office. You shall not deviate from the approved plans without first obtaining approval from this office. **Please sign and return the enclosed "Compliance Certification" form upon completion of the work.** If you have any questions, please contact Amy Robinson at the above address, telephone (615) 369-7507 or email [amy.m.robinson@usace.army.mil](mailto:amy.m.robinson@usace.army.mil).

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

John L. Hudson, P.E.  
Lieutenant Colonel  
Corps of Engineers  
District Engineer

BY:

Eric Reusch  
Chief, Eastern Regulatory Section  
Operations Division

Enclosures

**KYTC Bridge Replacement US 68/KY 80 (LRN-2011-00103)**  
**DA PERMIT SPECIAL CONDITIONS**

- 1. Permit Drawings:** The work must be completed in accordance with the plans and information submitted in support of the proposed work, as attached (Drawings numbered 1 through 17).
- 2. Fill Material:** The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.
- 3. Water Quality Certification:** The Permittee shall comply with general and special conditions of the attached Section 401 Water Quality Certification.
- 4. Real Estate:** The Permittee shall comply with all conditions of Corps of Engineers, Planning and Real Estate office approvals/real estate instruments.
- 5. Navigation Data Sheet:** The Regulatory Office (Amy Robinson at 615-369-7507) and/or Navigation Office (Wayne Ligon at 615-736-7802) shall be contacted at least two weeks prior to construction to set up a preconstruction meeting to discuss work sequencing, construction areas, temporary facilities, and navigation traffic. You must provide the necessary information as requested on the attached Navigation Data Sheet and submit it to the Corps of Engineers, Navigation Section (POC: Wayne Ligon at phone 615-736-7802, or email [benton.w.ligon@usace.army.mil](mailto:benton.w.ligon@usace.army.mil)) prior to the commencement of mobilization and/or bridge removal operations.
- 6. Bridge Debris Removal:** All debris must be completely removed from the river bottom and the bridge piers shall be removed to at least Elevation 330 or below. Post sonar investigations shall be performed to ensure complete debris and/or bridge removal. The sonar results shall be provided to the Corps of Engineers Regulatory Office and Navigation Section. The Permittee shall obtain Corps confirmation that the debris has been satisfactorily removed prior to demobilization.
- 7. Dredging:** If a disposal site is required for disposal of dredge material, the Permittee shall provide the location of the proposed disposal site to this office prior to disposal. If necessary, a stream and wetland jurisdictional determination of the disposal site shall be provided to this office. The disposal site should avoid impacts to the waters of the United States to the extent possible. If impacts to waters of the United States are necessary, a DA permit maybe required prior to disposal and the Permittee shall submit a DA application to obtain any necessary approvals prior to disposal.
- 8. Erosion Control:** Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area. Immediately after completion of the final grading of the land surface, all slopes, land surfaces, and filled

areas shall be stabilized using sod, degradable mats, barriers, or a combination of similar stabilizing materials to prevent erosion. The erosion control measures shall remain in place and be maintained until all authorized work has been completed and the site has been stabilized.

**9. Turbidity Barriers:** Prior to the initiation of any of the work authorized by this permit the Permittee shall install floating turbidity barriers with weighted skirts around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained until the authorized work has been completed and all erodible materials have been stabilized.

**10. Assurance of Navigation and Maintenance:** Any safety lights and signals prescribed by the U.S. Coast Guard must be installed and maintained at the Permittee's expense in navigable waters of the United States. Your use of the permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States. The Permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structures or work herein authorized, or if in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the Permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

**11. Ephemeral Stream Impact Minimization:** The Permittee shall construct new ephemeral channels along the northern side of the westbound lane and along the southern side of the eastbound lane of the reconstructed roadway approaches as provided on the permit drawings. The channels shall be stable and not actively eroding after completion of construction. A stable channel would not show evidence of significant bank erosion, head cutting, or other signs of instability.

**12. Compensatory Mitigation:** Within 6 months from the date of initiating the authorized work the Permittee shall complete the following mitigation objectives in accordance with the approved compensatory mitigation as detailed on Drawings numbered 14 through 17 of 17:

a. Offsite Mitigation- Shallow Water Habitat Enhancement: Stabilize 2,097 linear feet of existing levee on the interior of Duck Island as shown on sheet 14 through 17 of 17. This offsite compensatory mitigation area shall be preserved in perpetuity in accordance with the **Perpetual Conservation** Special Condition of this permit.

**13. Performance Standards:** To meet the objectives of the approved compensatory mitigation plan, the Permittee shall achieve the following performance standards:

a. The levee stabilization shall be constructed with appropriately sized riprap to ensure stability.

b. The levee shall not exhibit signs of active erosion after stabilization measures are constructed.

The Permittee shall achieve the above performance standards by the end of the 5-year monitoring period, with no maintenance during the 5th year of monitoring. In the event that the above performance standards have not been achieved, the Permittee shall undertake a remediation program approved by the Corps in accordance with the **Remediation** Special Condition of this permit.

**14. Monitoring and Reporting Timeframes:** To show compliance with the performance standards the Permittee shall complete the following:

a. Perform a time-zero monitoring event of the mitigation area within 60 days of completion of the compensatory mitigation objectives identified in the **Compensatory Mitigation** Special Condition of this permit.

b. Submit the time-zero report to the Corps within 60 days of completion of the monitoring event. The report will include at least one paragraph depicting baseline conditions of the mitigation site(s) prior to initiation of the compensatory mitigation objectives and a detailed plan view drawing of all created, enhanced and/or restored mitigation areas.

c. Subsequent to completion of the compensatory mitigation objectives, perform annual monitoring thereafter for a total of no less than 5 years of monitoring.

d. Submit annual monitoring reports to the Corps within 60 days of completion of the monitoring event.

e. Monitor the mitigation area and submit annual monitoring reports to the Corps until released in accordance with the **Mitigation Release** Special Condition of this permit.

**15. Reporting Format:** Annual monitoring reports shall follow a 10-page maximum report format for assessing compensatory mitigation sites. The Permittee shall submit all documentation to the Corps on 8½-inch by 11-inch paper, and include the following:

a. Project Overview (1 Page):

(1) Department of the Army Permit Number

(2) Name and contact information of Permittee and consultant

(3) Name of party responsible for conducting the monitoring and the date(s) the inspection was conducted

(4) A brief paragraph describing the purpose of the approved project, acreage and type of aquatic resources impacted, and mitigation acreage and type of aquatic resources

authorized to compensate for the aquatic impacts.

(5) Written description of the location, any identifiable landmarks of the compensatory mitigation project including information to locate the site perimeter(s), and coordinates of the mitigation site (expressed as latitude, longitudes, UTM's, state plane coordinate system, etc.).

(6) Dates compensatory mitigation commenced and/or was completed

(7) Short statement on whether the performance standards are being met

(8) Dates of any recent corrective or maintenance activities conducted since the previous report submission

(9) Specific recommendations for any additional corrective or remedial actions.

b. Requirements (1 page): List the monitoring requirements and performance standards, as specified in the approved mitigation plan and special conditions of this permit, and evaluate whether the compensatory mitigation project site is successfully achieving the approved performance standards or trending towards success.

c. Summary Data (maximum of 4 pages): Summary data should be provided to substantiate the success and/or potential challenges associated with the compensatory mitigation project. Photo documentation may be provided to support the findings and recommendations referenced in the monitoring report and to assist the PM in assessing whether the compensatory mitigation project is meeting applicable performance standards for that monitoring period. Submitted photos should be formatted to print on a standard 8 1/2" x 11" piece of paper, dated, and clearly labeled with the direction from which the photo was taken. The photo location points should also be identified on the appropriate maps.

d. Maps and Plans (maximum of 3 pages): Maps shall be provided to show the location of the compensatory mitigation site relative to other landscape features, habitat types, locations of photographic reference points, transects, sampling data points, and/or other features pertinent to the mitigation plan. In addition, the submitted maps and plans should clearly delineate the mitigation site perimeter(s). Each map or diagram should be formatted to print on a standard 8 1/2" x 11" piece of paper and include a legend and the location of any photos submitted for review. As-built plans may be included.

e. Conclusions (1 page): A general statement shall be included that describes the conditions of the compensatory mitigation project. If performance standards are not being met, a brief explanation of the difficulties and potential remedial actions proposed by the Permittee or sponsor, including a timetable, shall be provided. The District Commander will ultimately determine if the mitigation site is successful for a given monitoring period.

**16. Remediation:** If the compensatory mitigation fails to meet the performance standards 5 years after completion of the compensatory mitigation objectives, the compensatory mitigation will be deemed unsuccessful. Within 60 days of notification by the Corps that the compensatory mitigation is unsuccessful, the Permittee shall submit to the Corps an alternate compensatory mitigation proposal sufficient to create the functional lift required under this permit. The alternate compensatory mitigation proposal may be required to include additional mitigation to compensate for the temporal loss of wetland/stream function associated with the unsuccessful compensatory mitigation activities. The Corps reserves the right to fully evaluate, amend, and approve or reject the alternate compensatory mitigation proposal. Within 120 days of Corps approval, the Permittee will complete the alternate compensatory mitigation proposal.

**17. Mitigation Release:** The Permittee's responsibility to complete the required compensatory mitigation, as set forth in the **Compensatory Mitigation** Special Condition of this permit will not be considered fulfilled until mitigation success has been demonstrated and written verification has been provided by the Corps. A mitigation area which has been released will require no further monitoring or reporting by the Permittee; however the Permittee, Successors and subsequent Transferees remain perpetually responsible to ensure that the mitigation area(s) remain in a condition appropriate to offset the authorized impacts in accordance with General Condition 2 of this permit.

**18. Perpetual Conservation:** The Permittee shall maintain the area referenced in the **Compensatory Mitigation** Special Condition in a natural state in perpetuity. The Permittee agrees that the only future utilization of these areas will be as a purely natural area and the following uses and/or activities will be prohibited except as required or authorized by this permit:

- a. Construction or placing buildings, roads, signs, billboards or other advertising, utilities or other structures on or above the ground. Elevated boardwalks, hiking trails and camping areas will be permitted as long as they do not involve any of the other prohibited uses listed below:
- b. Dumping or placing soil or other substance or material as landfill or dumping or placing of trash, waste or unsightly or offensive material.
- c. Removal or destruction of trees, shrubs, or other vegetation.
- d. Excavation, dredging or removal of loam, peat, gravel, soil, rock, or other material substance in such a manner as to affect the surface.
- e. Surface use, except for purposes that permit the land or water area to remain predominantly in its natural condition.
- f. Activities detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat preservation.
- g. Acts or uses detrimental to such retention of land or water areas.
- h. Acts or uses detrimental to the preservation of the structural integrity or the physical appearance of sites or properties of historical, architectural, or cultural significance.

**19. Regulatory Agency Changes:** Should any other regulatory agency require changes to the work authorized or obligated by this permit, the Permittee is advised that a

modification to this permit instrument is required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit from the Nashville District Regulatory Office.

**20. Compliance Certification:** Within 60 days of completion of the authorized work or at the expiration of the construction authorization of this permit, whichever occurs first, the Permittee shall complete the attached Compliance Certification form and submit to the Corps. In the event that the completed work deviates, in any manner, from the authorized work, the Permittee shall describe, on the Self-Certification Form, the deviations between the work authorized by the permit and the work as constructed. Please note that the description of any deviations on the Self-Certification Form does not constitute approval of any deviations by the Corps.

**21. Historic Properties:** The Permittee shall comply with all terms and conditions as outlined in the attached Memorandum of Agreement (MOA) between FHWA, KYTC, the Kentucky State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation in order to resolve the adverse effect of replacement of the Henry Lawrence Bridge and potential impacts to archaeological sites.

**22. Endangered Species Act Compliance:** The Permittee shall comply with all terms and conditions as outlined in the attached "Biological Assessment for the KYTC US-68 Reconstruction, Trigg and Marshall Counties, Kentucky, KYTC", dated June 2012, in particular the implementation of avoidance and minimization measures for the Gray bat.

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Kentucky Transportation Cabinet	File Number: 2011-00103	Date: 11/18/2014
Attached is:		See Section below
<input checked="" type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input checked="" type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I -** The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at

[http://www.usace.army.mil/CECW/Pages/reg\\_materials.aspx](http://www.usace.army.mil/CECW/Pages/reg_materials.aspx) or Corps regulations at 33 CFR Part 331.

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

DRAFT

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:

If you only have questions regarding the appeal process you may also contact: **Appeal Review Officer (513-684-7261)**

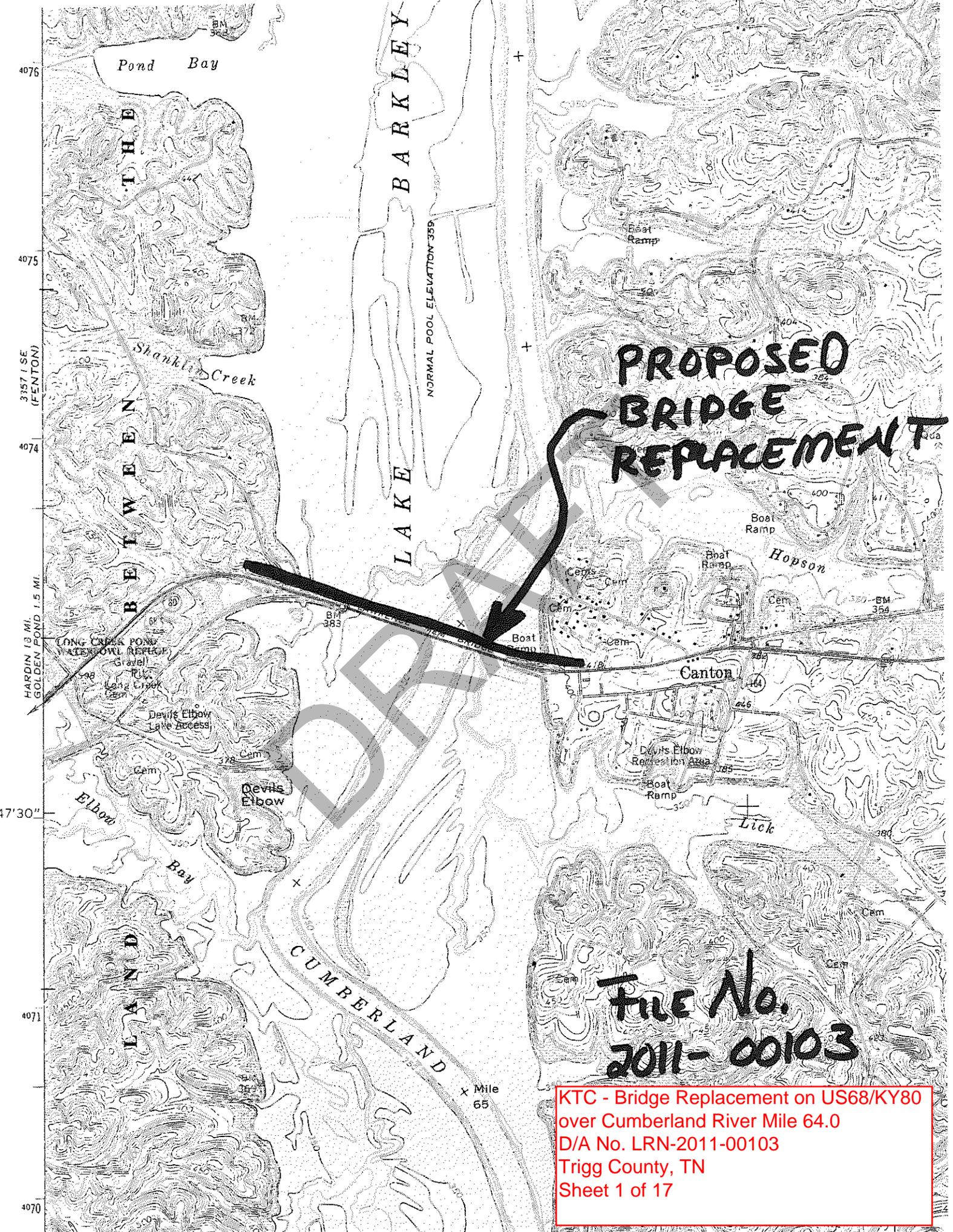
**U.S. Army Corps of Engineers  
Great Lakes and Ohio River Division  
ATTN: Appeal Review Officer  
550 Main Street RM 10032  
Cincinnati, OH 45202-3222**

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Date:

Telephone number:

\_\_\_\_\_  
Signature of appellant or agent.



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B E T W E E N  
L A N D

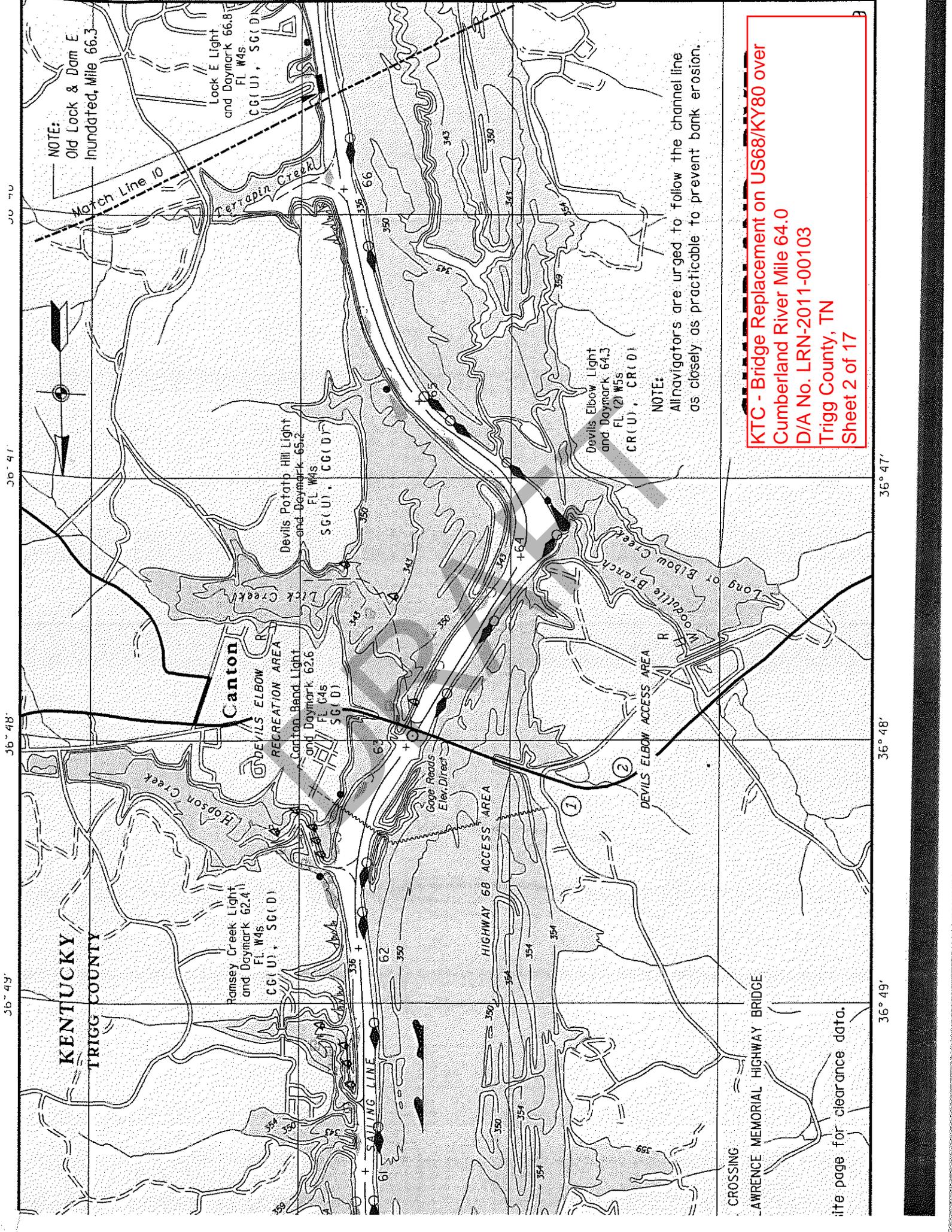
BARKLEY  
LAKE

NORMAL POOL ELEVATION 399

**PROPOSED  
BRIDGE  
REPLACEMENT**

**File No.  
2011-00103**

**KTC - Bridge Replacement on US68/KY80  
over Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 1 of 17**



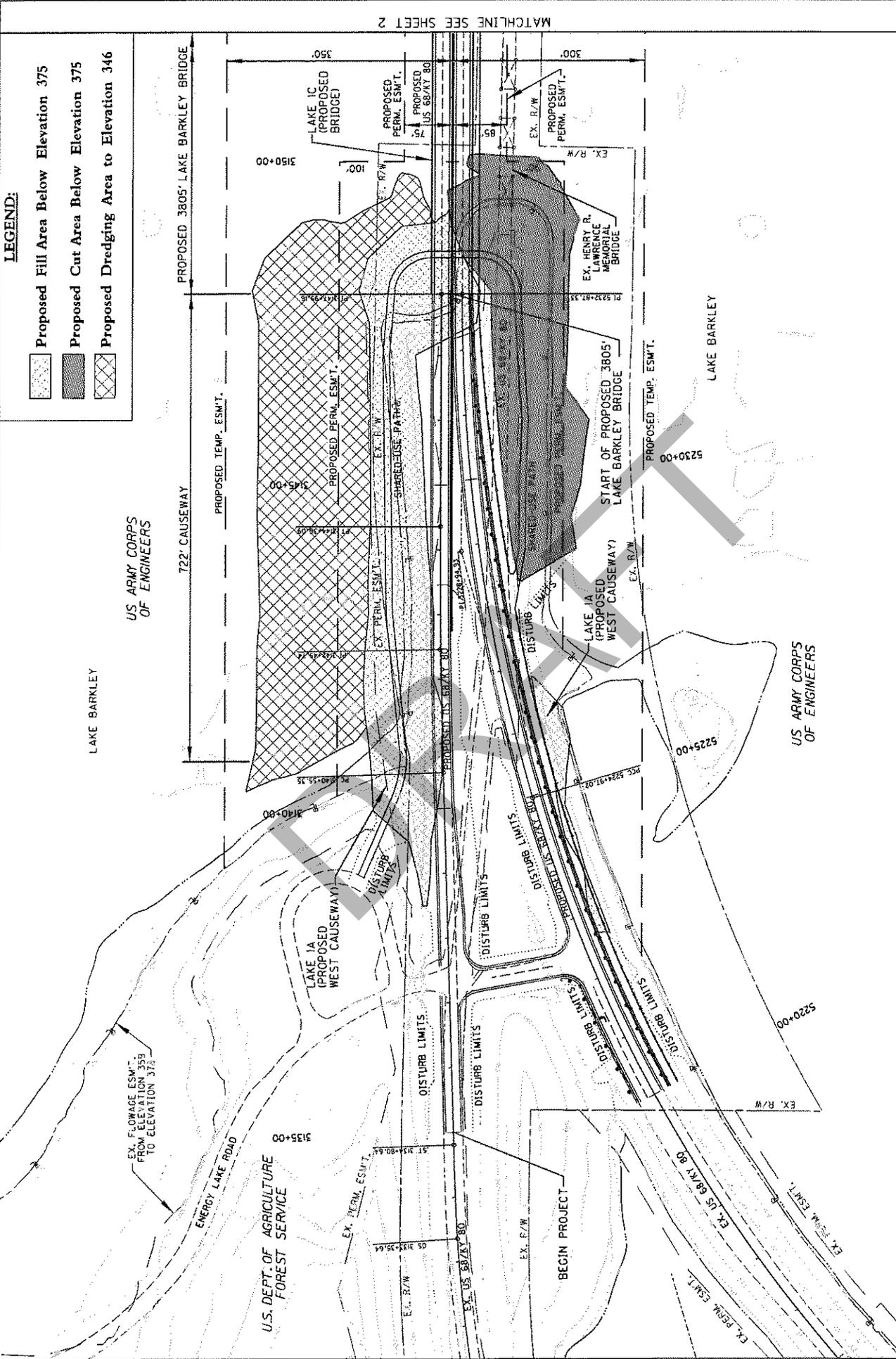
**KTC - Bridge Replacement on US68/KY80 over  
Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 2 of 17**

NOTE:  
All navigators are urged to follow the channel line  
as closely as practicable to prevent bank erosion.

ite page for clearance data.

CROSSING  
LAWRENCE MEMORIAL HIGHWAY BRIDGE

36° 49' 36° 48' 36° 47' 90° 49' 90° 48' 90° 47'

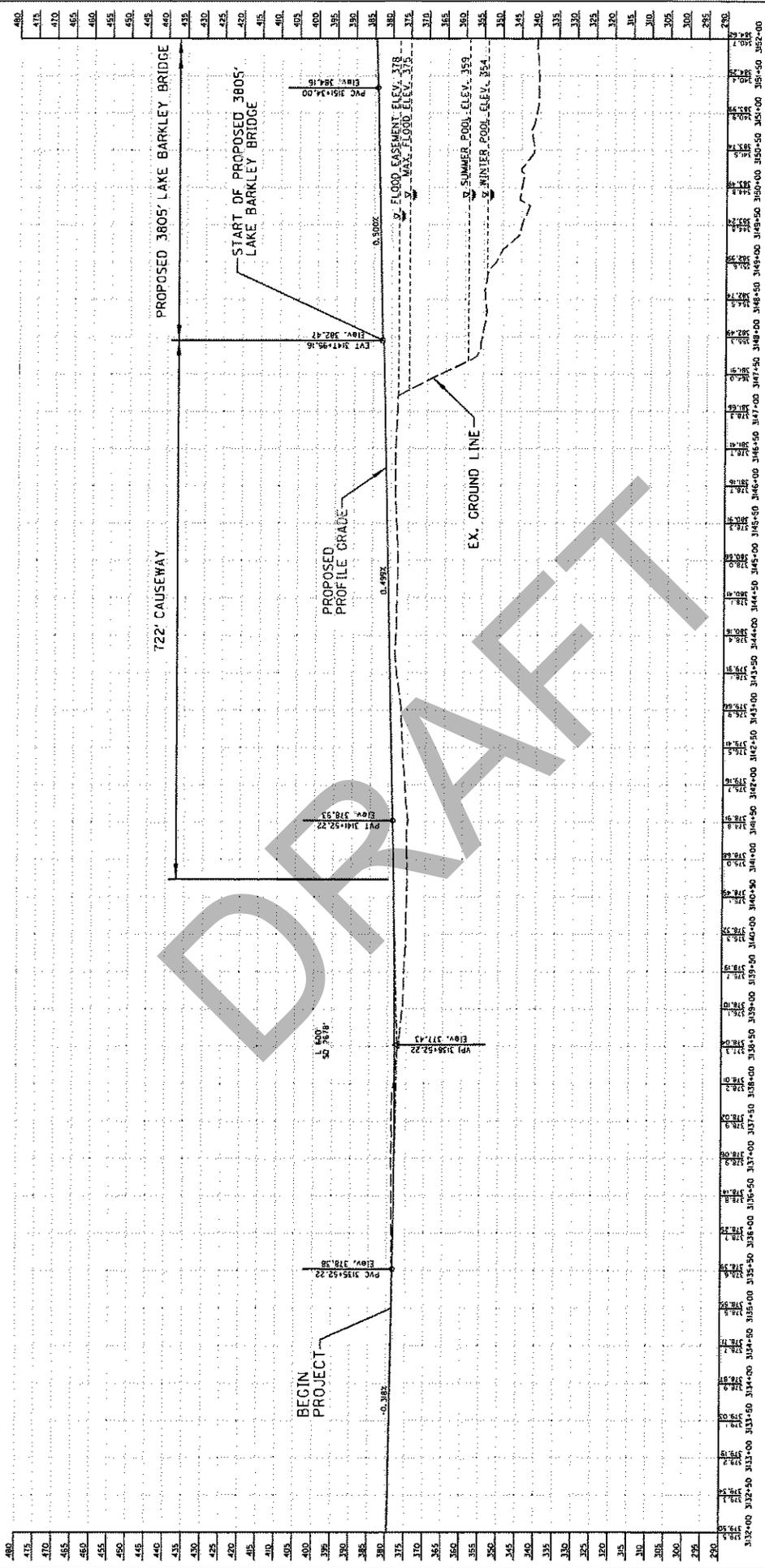


**LEGEND:**

-  Proposed Fill Area Below Elevation 375
-  Proposed Cut Area Below Elevation 375
-  Proposed Dredging Area to Elevation 346

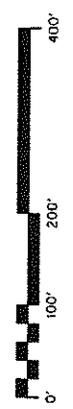
**KTC - Bridge Replacement on US68/KY80**  
 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 3 of 17

USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401



**KTC - Bridge Replacement on US68/KY80**  
 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 4 of 17

USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401

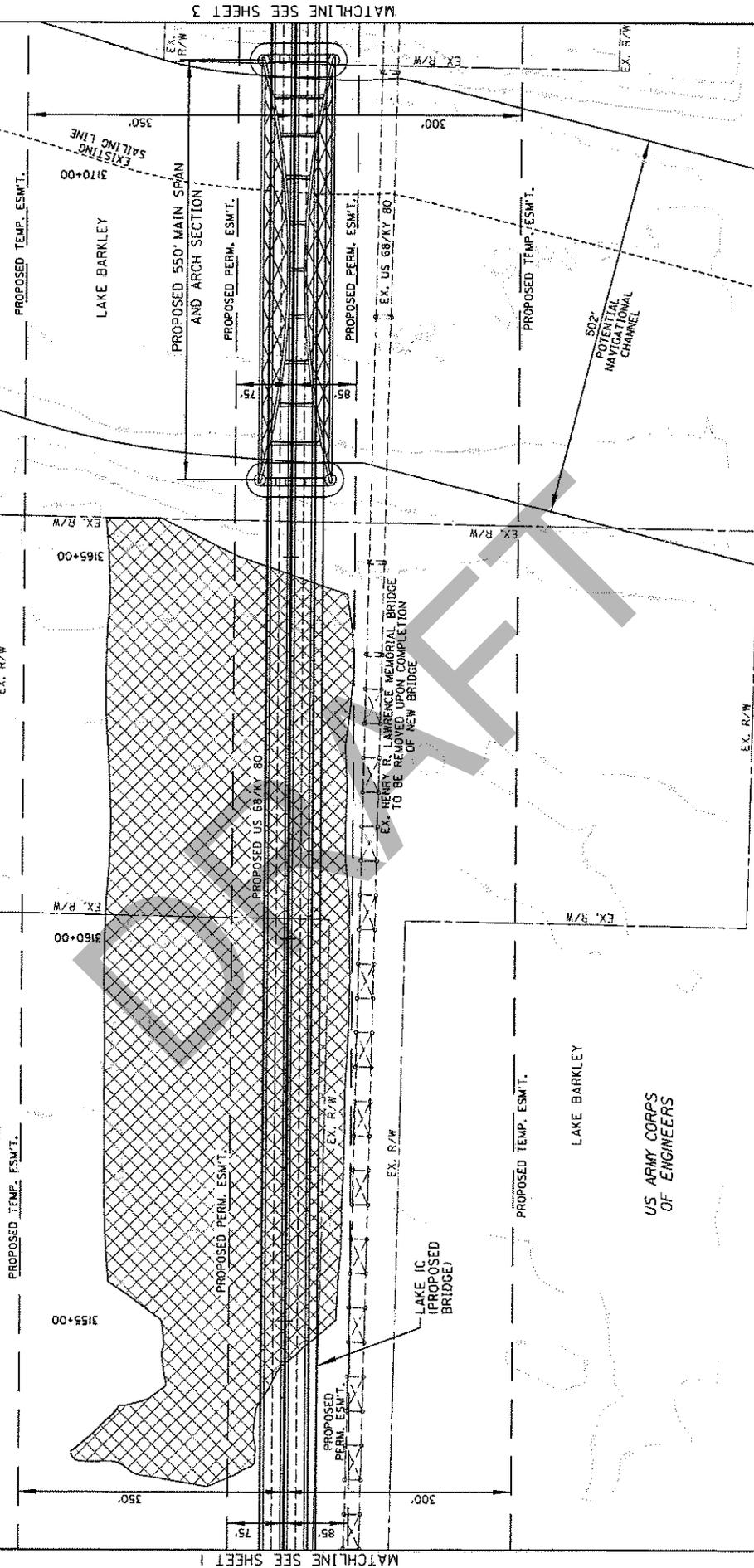


**LEGEND:**

- Proposed Fill Area Below Elevation 375
- Proposed Cut Area Below Elevation 375
- Proposed Dredging Area to Elevation 346

US ARMY CORPS  
OF ENGINEERS

PROPOSED 3805' LAKE BARKLEY BRIDGE



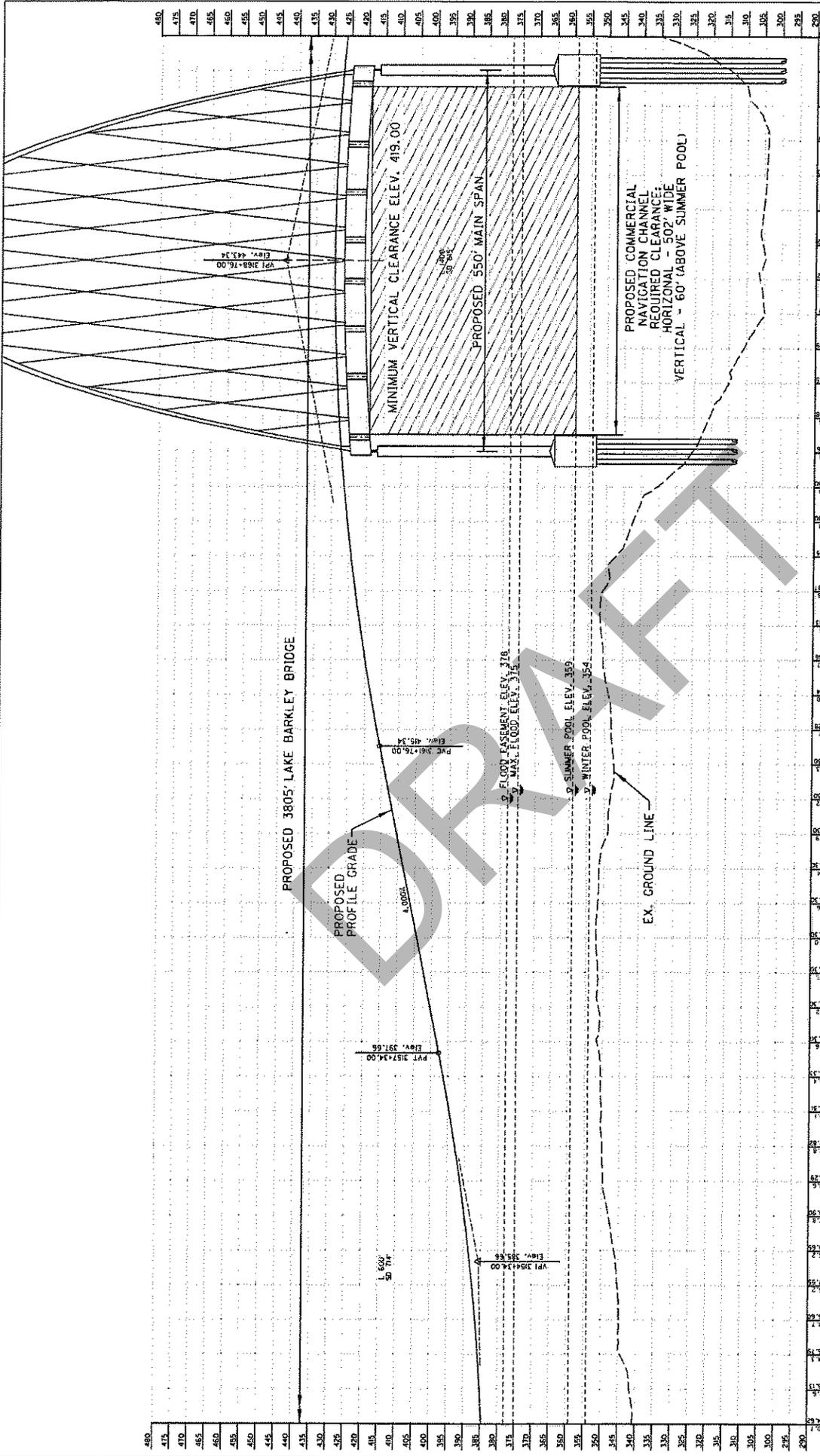
MATCHLINE SEE SHEET 1

MATCHLINE SEE SHEET 3

**KTC - Bridge Replacement on US68/KY80 over  
Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 5 of 17**

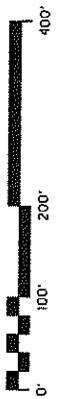
USACE - CWA SECTION 404  
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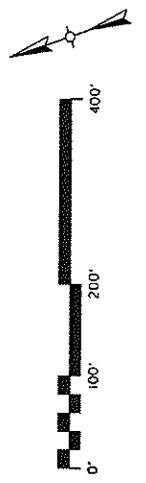
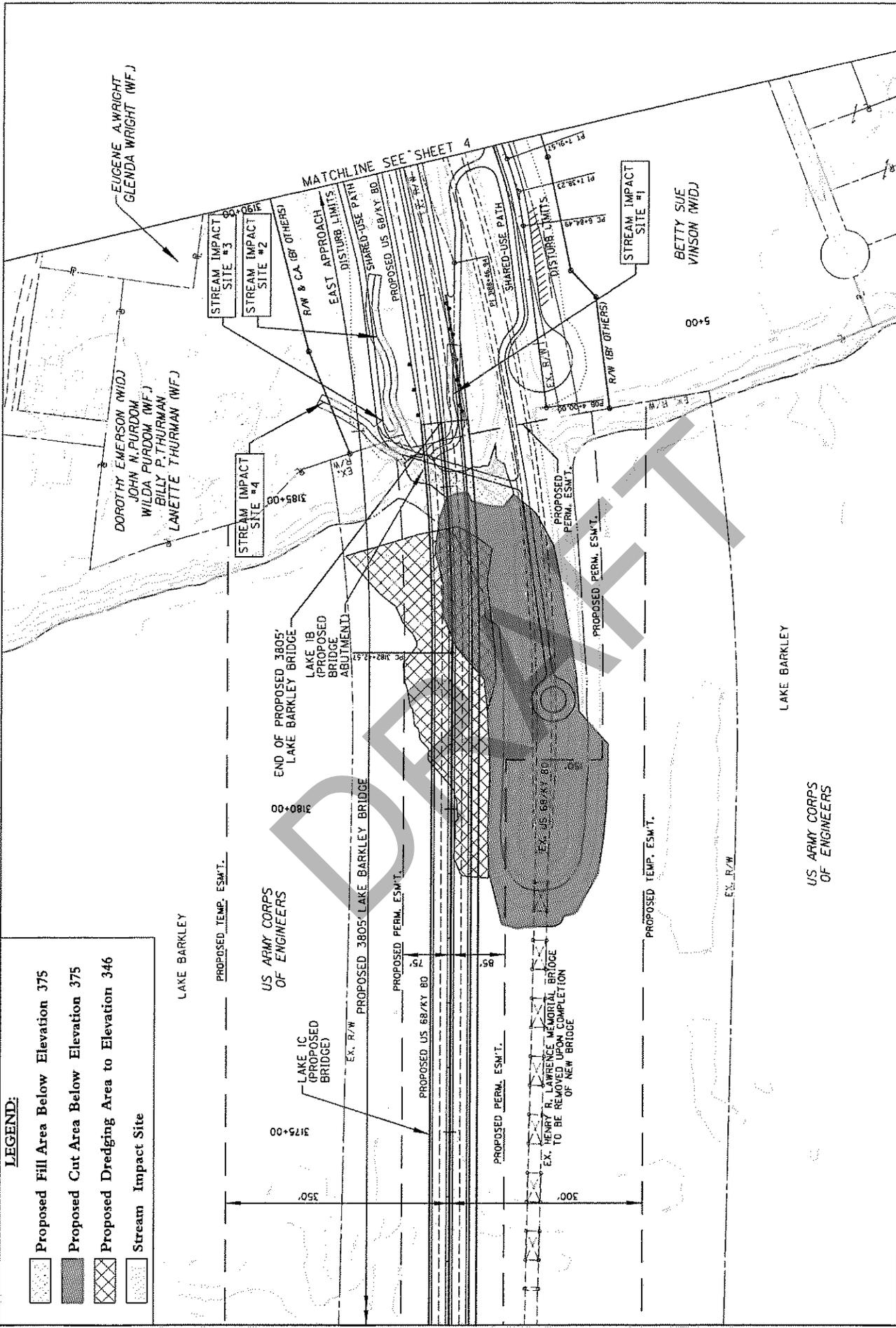
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D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 6 of 17**

USACE - CWA SECTION 404  
USACE - RHA SECTION 10  
KDOW - CWA SECTION 401



**LEGEND:**

-  Proposed Fill Area Below Elevation 375
-  Proposed Cut Area Below Elevation 375
-  Proposed Dredging Area to Elevation 346
-  Stream Impact Site

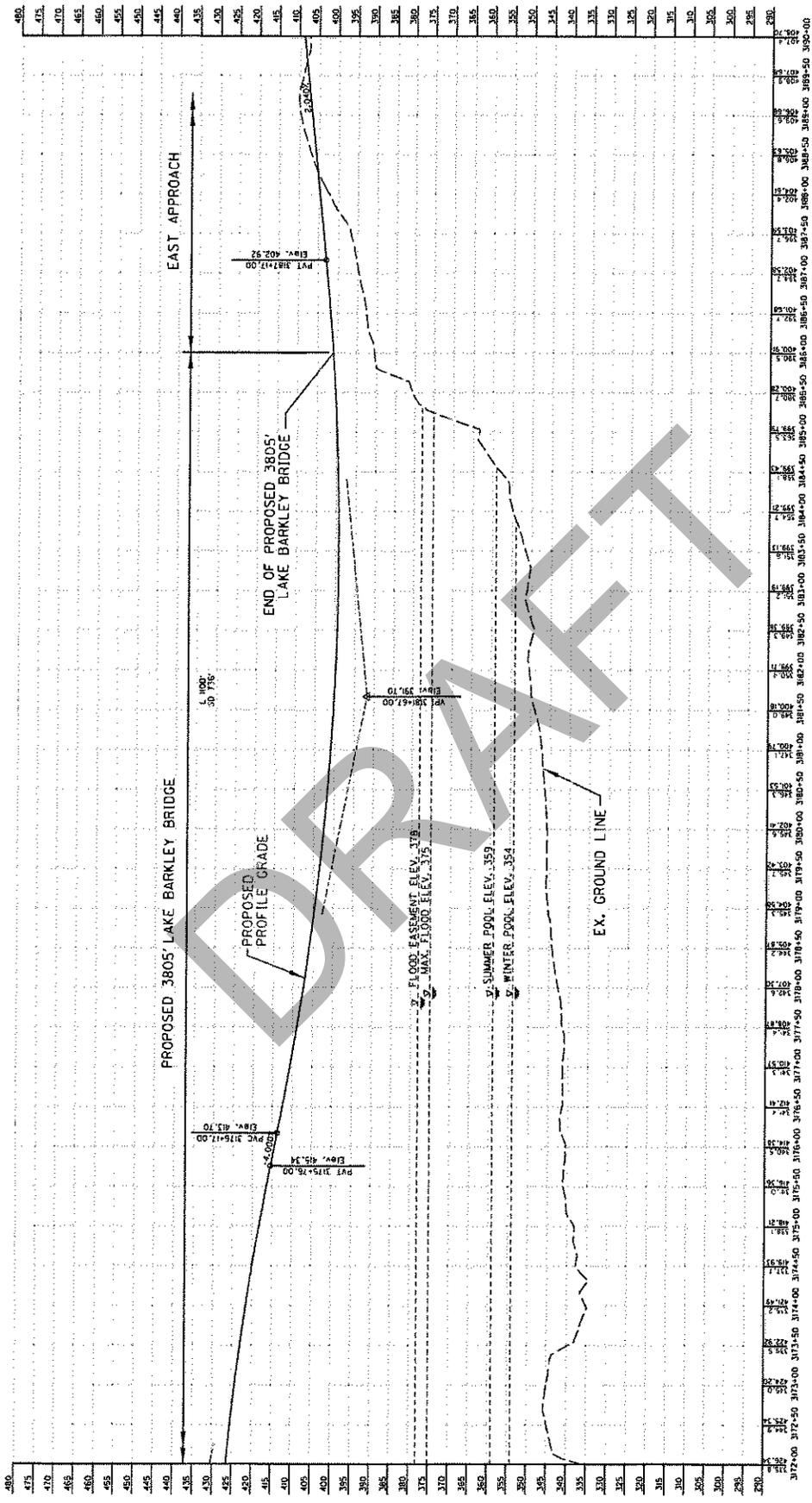


USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401

**KTC - Bridge Replacement on US68/  
 KY80 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 7 of 17**

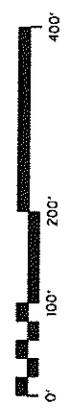
MATCHLINE SEE SHEET 2

MATCHLINE SEE SHEET 4



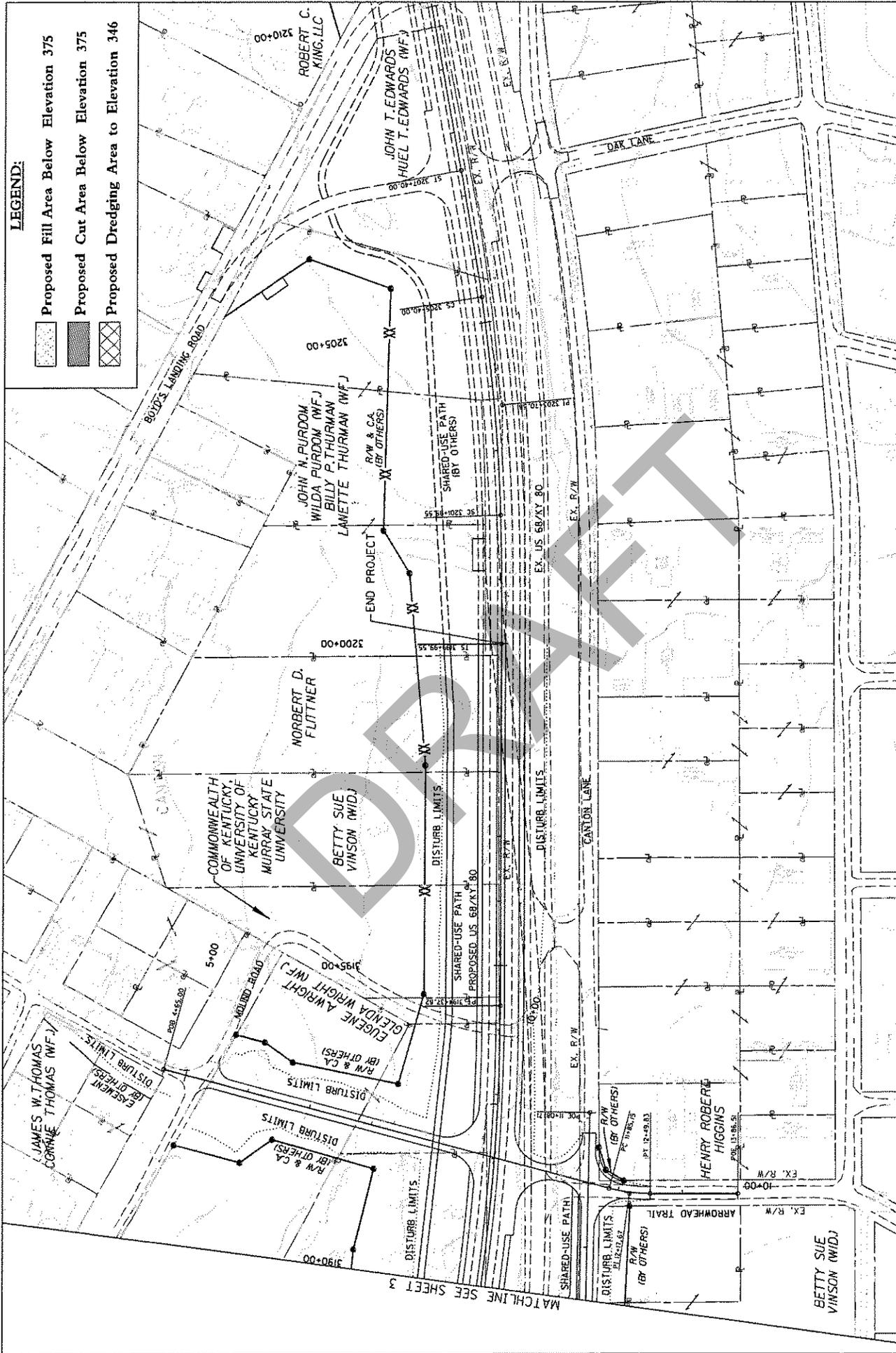
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 Sheet 8 of 17

USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401



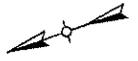
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-  Proposed Fill Area Below Elevation 375
-  Proposed Cut Area Below Elevation 375
-  Proposed Dredging Area to Elevation 346

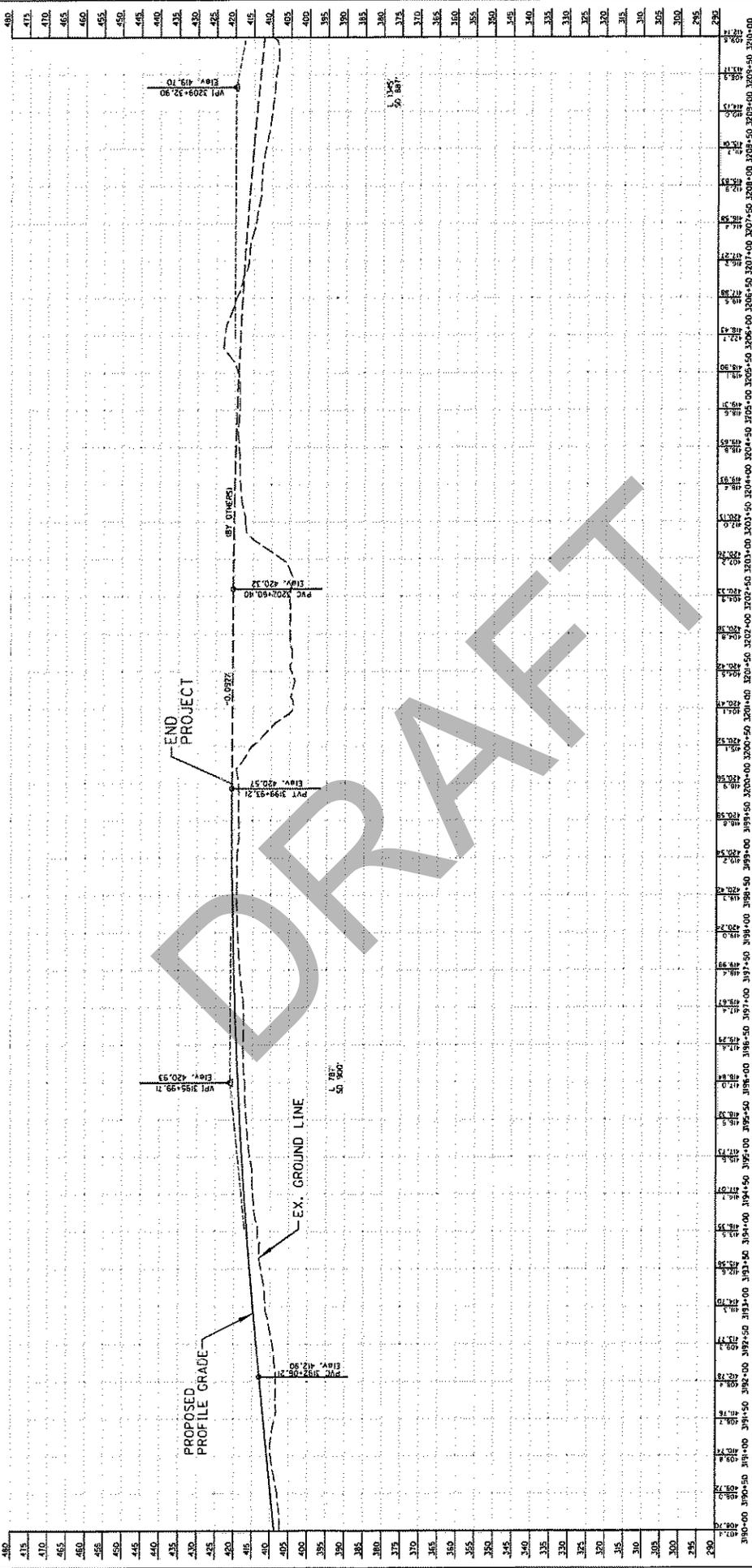


USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401

KTC - Bridge Replacement on US68/KY80  
 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 9 of 17

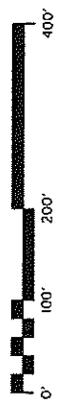


MATCHLINE SEE SHEET 3



KTC - Bridge Replacement on US68/  
 KY80 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 10 of 17

USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401

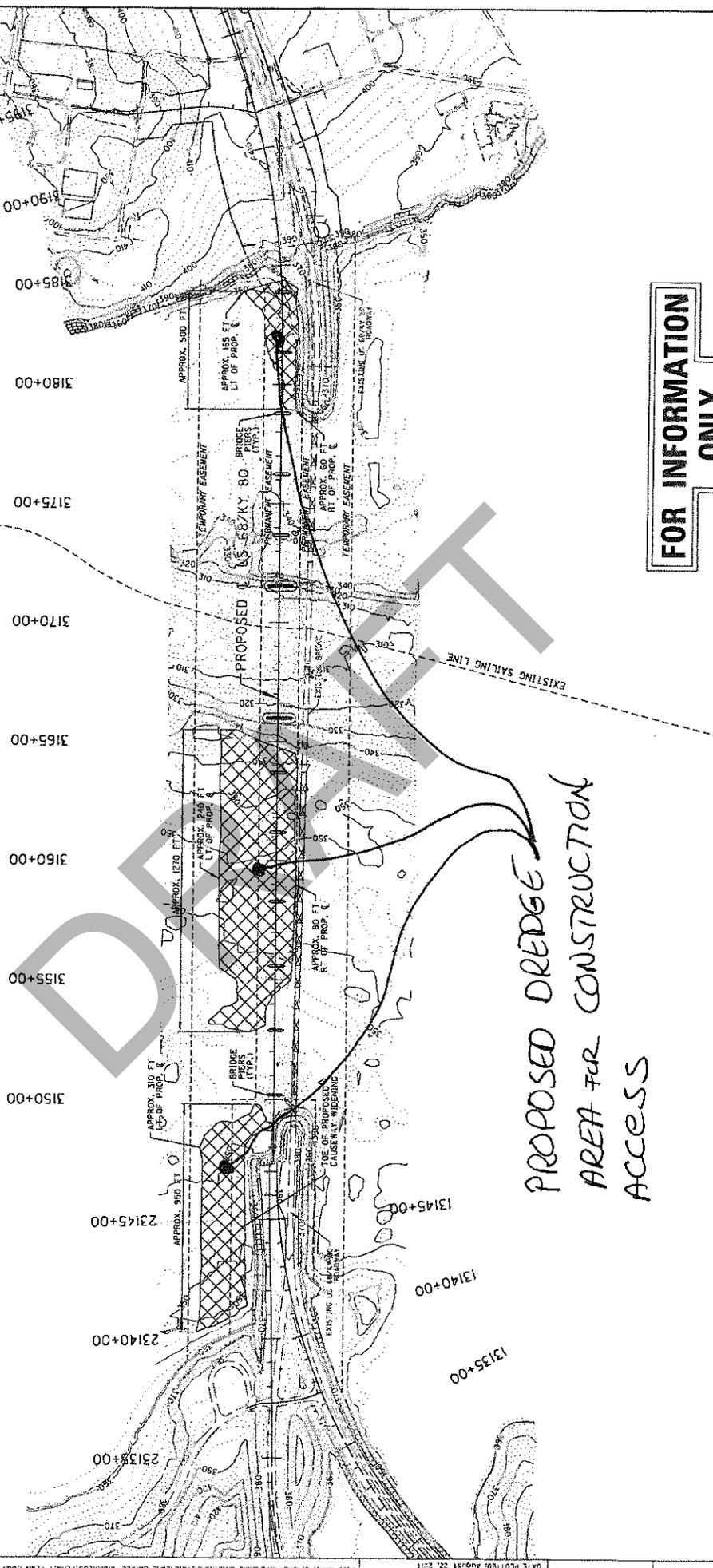


COUNTY OF	TRIGG	ITEM NO.	1-180.60	SHEET NO.	R1E1
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**NOTES:**  
 IT IS ANTICIPATED THAT THE CONTRACTOR MAY CHOOSE MARINE-BASED CONSTRUCTION METHODS USING BARRIES. REQUIRED WATER DEPTHS IN THE PROJECT AREA, DREDGING MAY BE ESPECIALLY WHEN LAKE LEVELS ARE AT WINTER POOL LEVELS.  
 ESTIMATED DREDGING IMPACT AREAS WERE INCLUDED IN THE DEPARTMENT OF THE ARMY PERMIT APPLICATION AS A POTENTIAL TEMPORARY CONSTRUCTION IMPACT FOR THIS METHOD OF CONSTRUCTION. THESE AREAS WERE DETERMINED TO BE BELOW WINTER POOL LEVELS AND WERE NECESSARY TO PROVIDE BARGE ACCESS THROUGHOUT THE PROJECT SITE AT ALL TIMES. IMPACT AREAS IN THIS SHEET WERE DETERMINED BASED ON DREDGING TO AN ELEVATION OF 346. THE APPROXIMATE LOCATIONS ARE SHOWN WITH CROSS HATCHING ON THIS SHEET.  
 THIS SHEET IS INCLUDED IN THE PLANS FOR INFORMATION ONLY AND IS NOT INTENDED TO SUPERSEDE LANGUAGE IN THE PERMIT, CONTRACT, SPECIFICATIONS, OR ANY OTHER DOCUMENTS. THE CONTRACTOR FROM CROSSING OTHER MEANS AND METHODS OF CONSTRUCTION, PROVIDED THAT THEY MEET THE TERMS OF THE PERMIT.

**LEGEND:**  
 = Potential Dredging Area for Construction Barge Access



**PROPOSED DREDGE  
 AREA FOR CONSTRUCTION  
 ACCESS**

**FOR INFORMATION  
 ONLY**

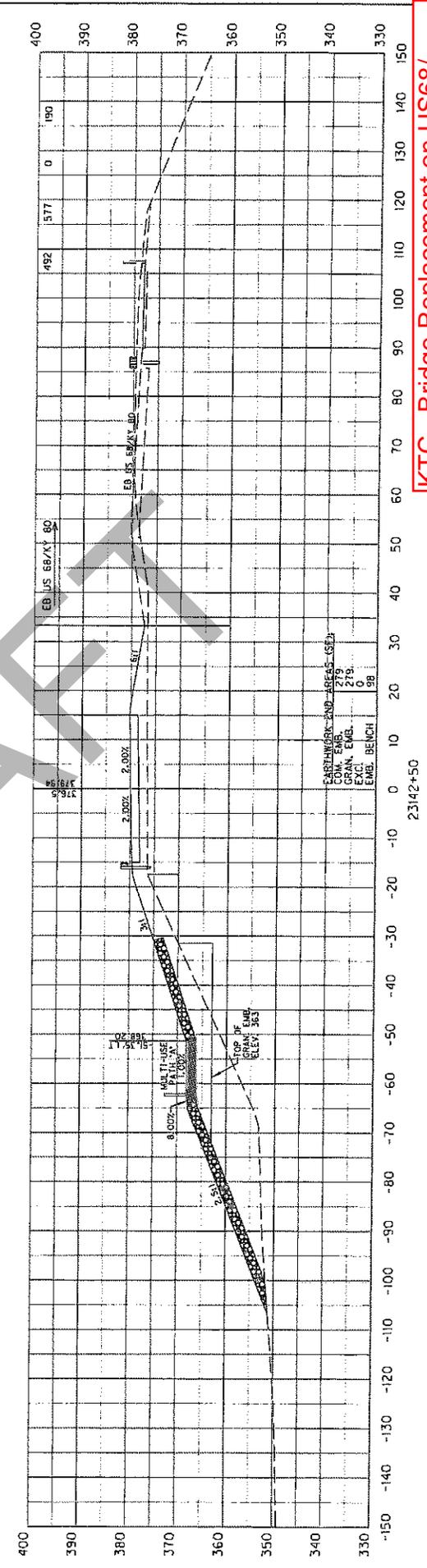
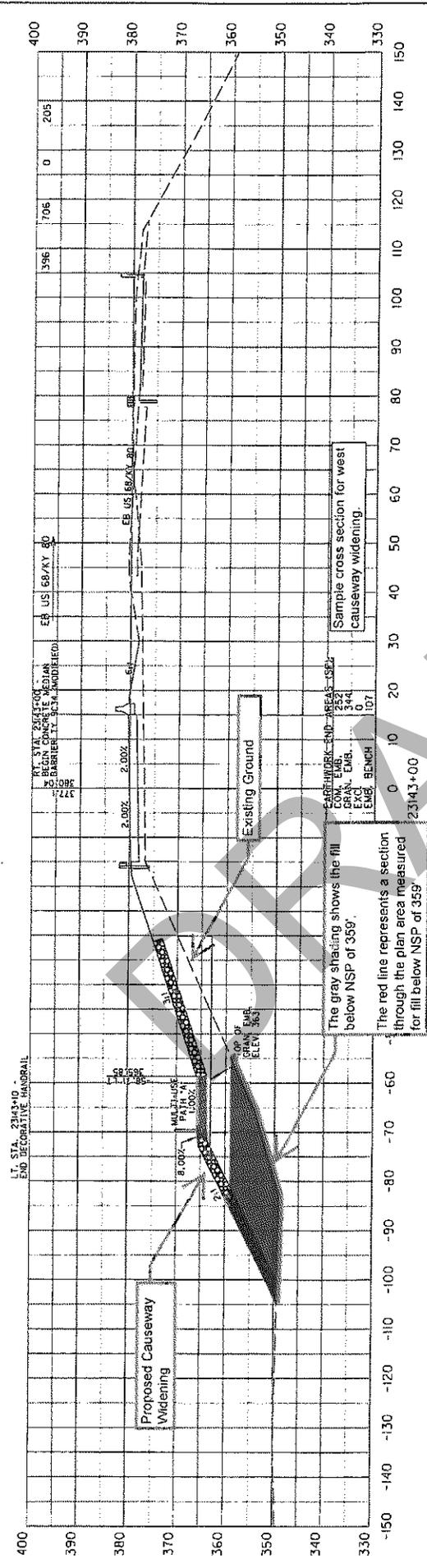
**KTC - Bridge Replacement on US68/KY80  
 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 11 of 17**



**KTC - Bridge Replacement on US68/  
 KY80 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 12 of 17**

TRUCKS	1-180.60	SHEET NO.	X20
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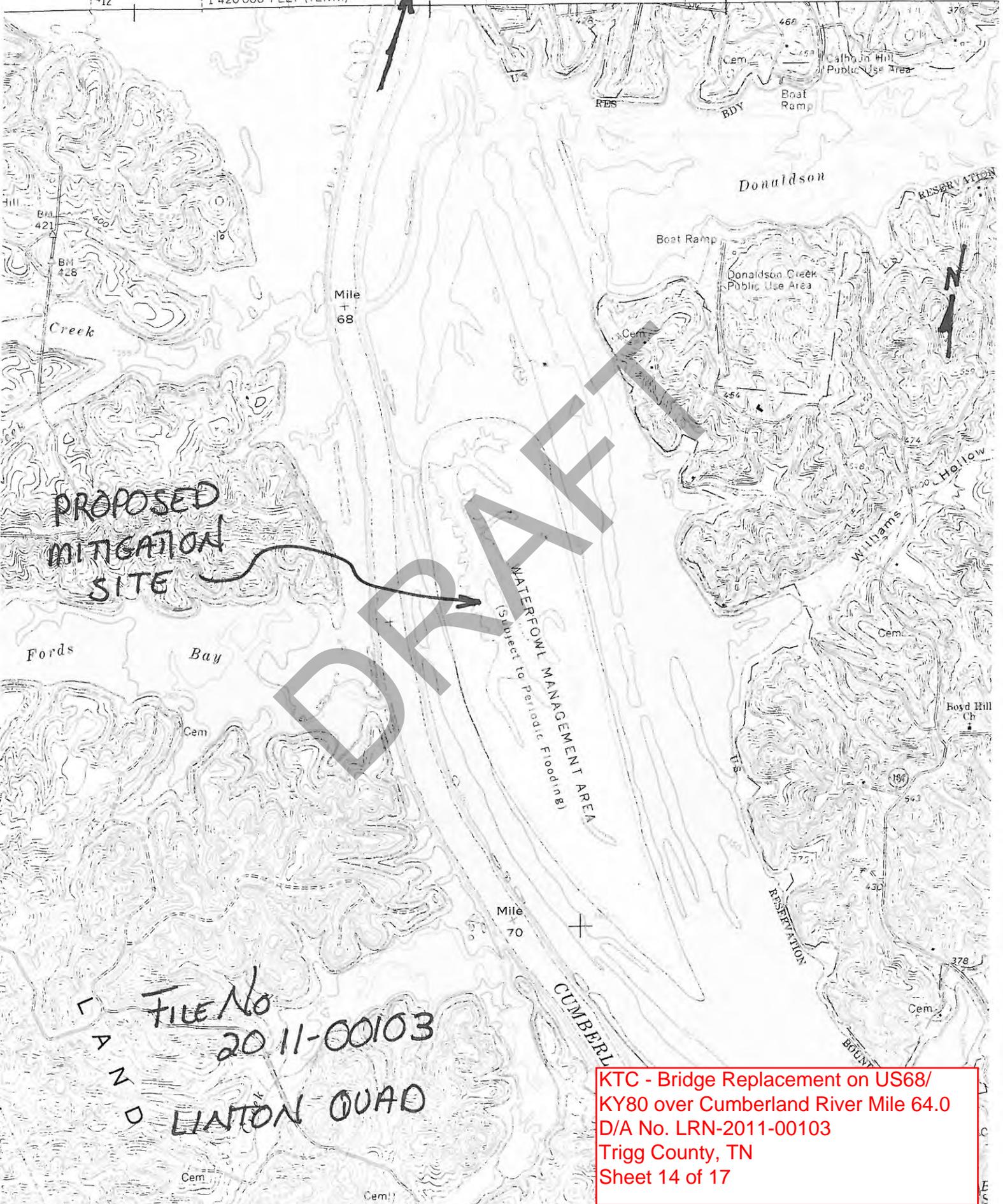
EARTHWORK VOLUMES (CU YD)  
 COM. GRAN. EMB. EXC. BENCH



KTC - Bridge Replacement on US68/  
 KY80 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 13 of 17

TO US 68 / KY 80 BRIDGE

12 1 420 000 FEET (TENN.) 14 57'30" 15 16 3457 IV SW (CANTON)



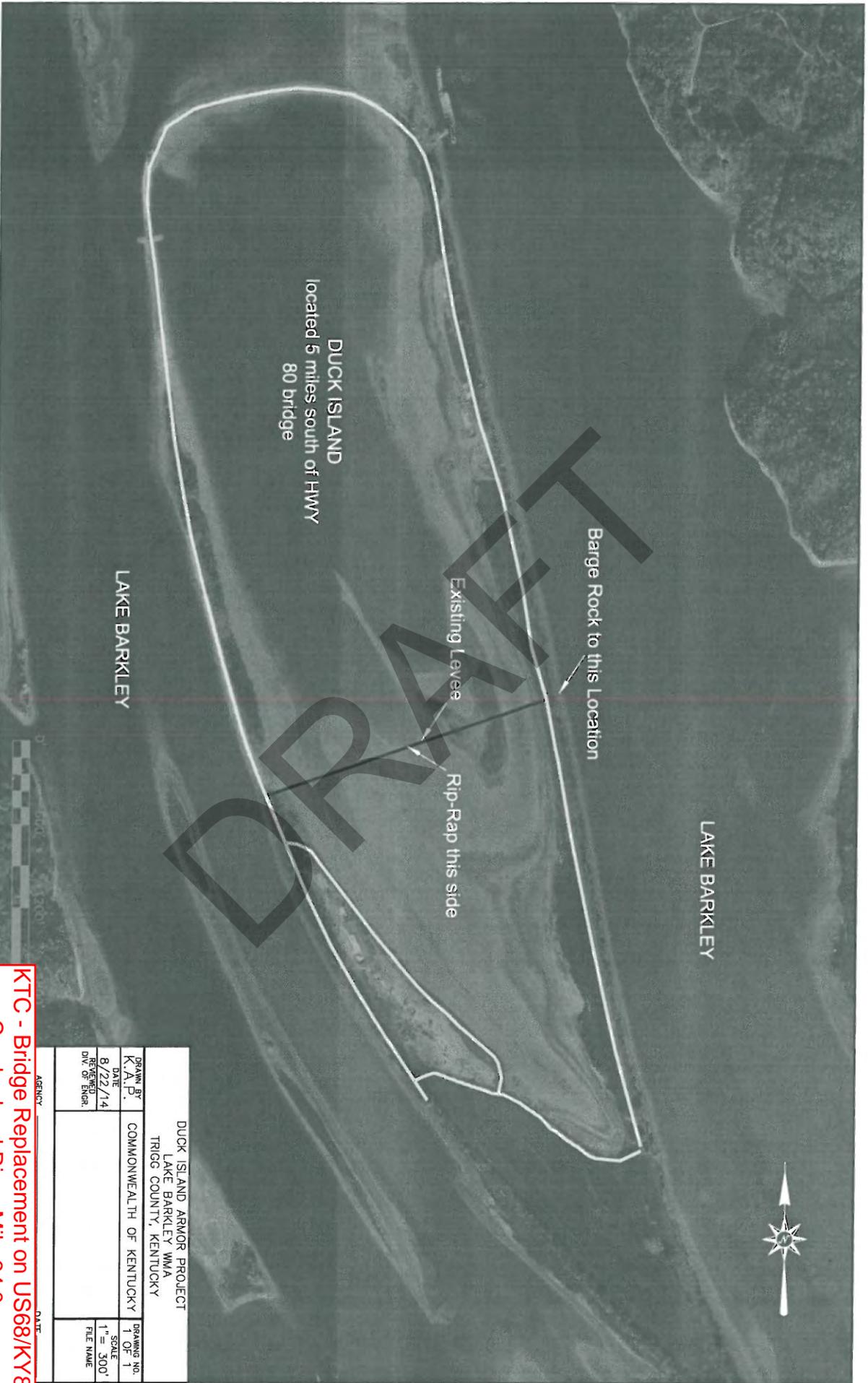
PROPOSED  
MITIGATION  
SITE

DRAFT

WATERFOOT MANAGEMENT AREA  
(Subject to Periodic Flooding)

FILE No  
20 11-00103  
CANTON QUAD

KTC - Bridge Replacement on US68/  
KY80 over Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 14 of 17



LAKE BARKLEY

DUCK ISLAND  
located 5 miles south of HWY  
80 bridge

Existing Levee

Rip-Rap this side

Barge Rock to this Location

LAKE BARKLEY

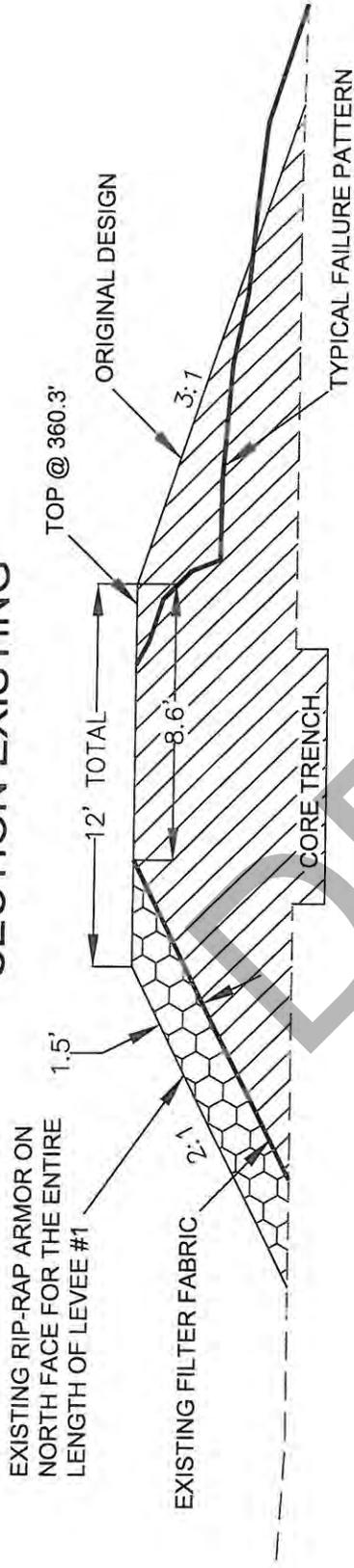


DUCK ISLAND ARMOR PROJECT LAKE BARKLEY WMA TRIGG COUNTY, KENTUCKY		DRAWING NO. 1 OF 1
DRAWN BY K.A.P.	COMMONWEALTH OF KENTUCKY	SCALE 1" = 300'
DATE 8/22/14		FILE NAME
REVIEWED DIV. OF ENGR.		
AGENCY		DATE

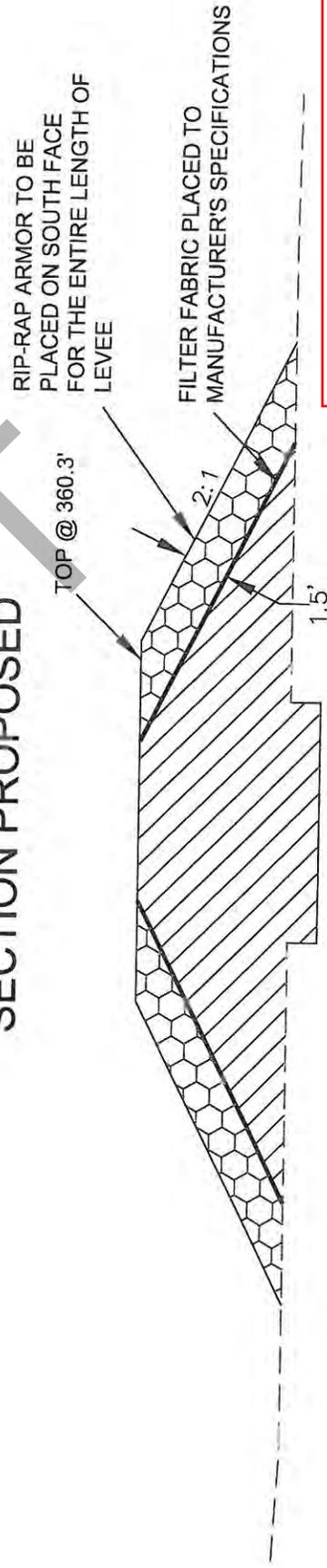
*PROPOSED*  
*FILE NO.*

**KTC - Bridge Replacement on US68/KY80  
over Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 15 of 17**

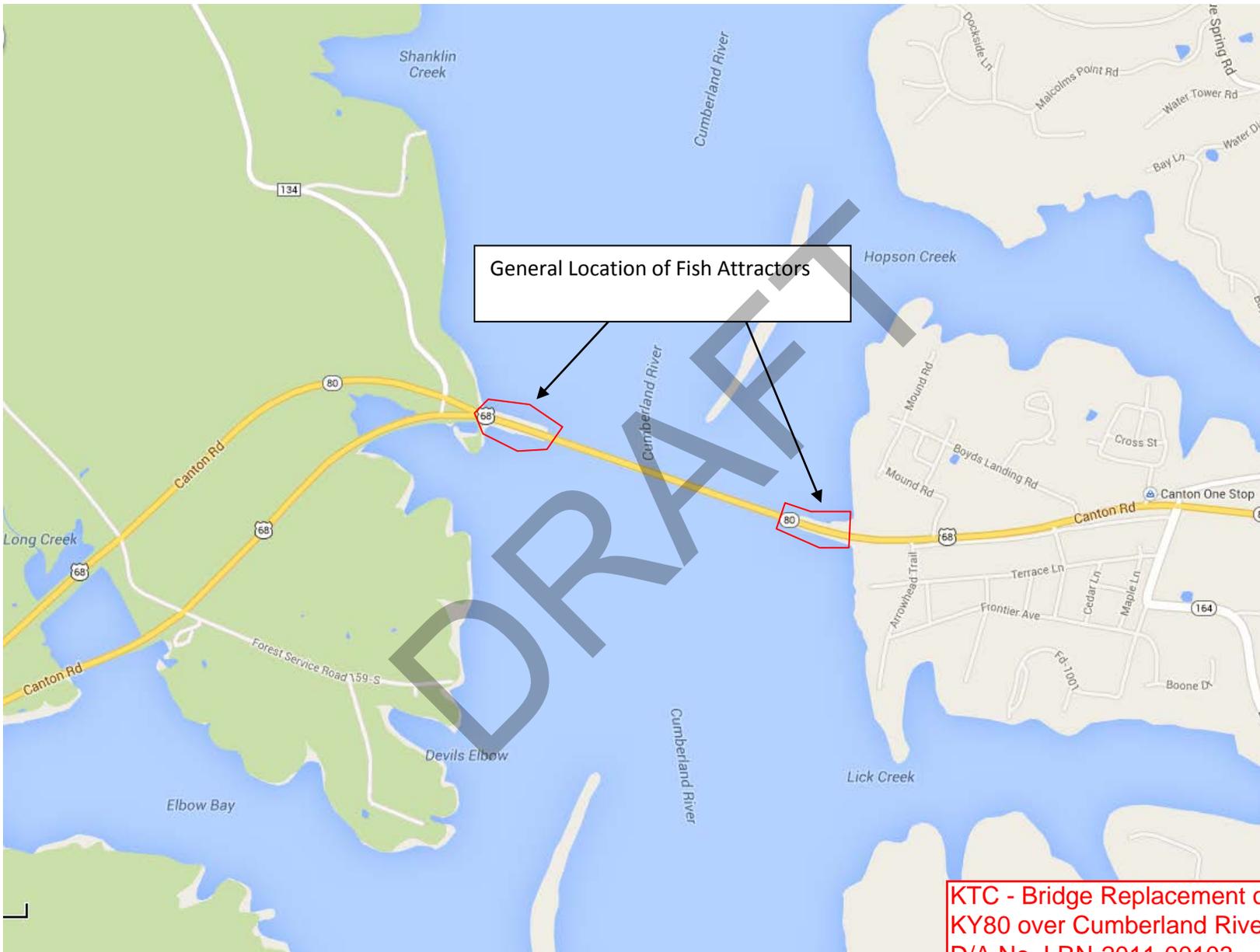
# TYPICAL LEVEE SECTION EXISTING



# TYPICAL LEVEE SECTION PROPOSED



KTC - Bridge Replacement on US68/KY80  
 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 16 of 17



KTC - Bridge Replacement on US68/  
KY80 over Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 17 of 17

**APPROVED JURISDICTIONAL DETERMINATION FORM**  
**U.S. Army Corps of Engineers**

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

**BACKGROUND INFORMATION**

**A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):** 5 Sep 2014

**C. PROJECT LOCATION AND BACKGROUND INFORMATION:** The proposed project is located on a navigable water located within the regulatory jurisdiction of the Nashville District Corps of Engineers. The Nashville District has previously determined the extent of navigable waters within the drainage areas of the Tennessee and Cumberland Rivers located within the states of Tennessee, Kentucky, Alabama, and Mississippi. Posting of this JD establishes that the Corps has jurisdiction over navigable waters under Section 10 of the Rivers and Harbors Act of 1899 not only for this application but also for all future permit applications located on recognized navigable waters. Future permit applications will reference this generic JD which will eliminate the need to post separate JDs for each future application. Since jurisdiction over Section 10 navigable waters is straightforward, we have determined that it serves no useful purpose to perform and post a separate JD for each action. Development and posting of this generic JD will allow limited staff resources to be focused on other JDs that require more in-depth analysis. (Additionally, since a significant nexus determination and related factors are not required for this JD, non-relevant sections of the standard seven-page JD form have been eliminated in the interest of brevity and clarity.)

State: Kentucky

County: Trigg County

City: near Canton

Center coordinates of site (lat/long in degree decimal format): Lat 36-47-57.82, Lon: -87-58-31.86

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Cumberland River

Name of watershed or Hydrologic Unit Code (HUC): 05130205- Lower Cumberland

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., adjacent wetlands, offsite mitigation sites, disposal sites, etc) are associated with this action and recorded on a different JD form.

**D. REVIEW PERFORMED FOR EVALUATION:** Office (Desk) Determination. Date: 5 Sep 2014

**SUMMARY OF FINDINGS**

**RHA SECTION 10 DETERMINATION OF JURISDICTION.**

There **Are** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: Prior to the determination and listing of the Nashville District's navigable waters, detailed navigability studies were performed throughout the Nashville District to determine which waters meet the navigable waters definition found in 33 CFR Part 329. These studies are available for review in the Nashville District office. Upon completion of these navigability studies, the Nashville District issued Public Notice #86-23, dated 8 May 1986, listing all navigable waters within the district. These complete list of navigable waters can be found on the district's website at [http://lm.usace.army.mil/cof/navigable\\_waters\\_list.htm](http://lm.usace.army.mil/cof/navigable_waters_list.htm).

Identify TNW: Cumberland River Mile 63.1

Summarize rationale supporting determination:

**DATA SOURCES**

**SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):**

Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: with application received in June 2014.

Data sheets prepared/submitted by or on behalf of the applicant/consultant.

Office concurs with data sheets/delineation report.

Office does not concur with data sheets/delineation report.

Data sheets prepared by the Corps:

Corps navigable waters' study: Navigable water as listed in Nashville District Public Notice #86-23, dated 8 May 1986

U.S. Geological Survey map(s). Cite scale & quad name: Canton Quad

USDA Natural Resources Conservation Service Soil Survey. Citation:

FEMA/FIRM maps:

100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)

Photographs:  Aerial (Name & Date): Google Earth, Sep 2013

or  Other (Name & Date): Cumberland River Navigation Chart, chart no 9.

Previous determination(s). File no. and date of response letter: 2011-00103 - Geotechnical Survey at same location; April 2014

Applicable/supporting case law:

Applicable/supporting scientific literature:

Other information (please specify):

# PRELIMINARY JURISDICTIONAL DETERMINATION FORM

## BACKGROUND INFORMATION

- A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):** 5 September 2014
- B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:**  
Kentucky Transportation Cabinet; Department of Highways  
200 Mero Street, Frankfort, KY 40622
- C. DISTRICT OFFICE, FILE NAME, AND NUMBER:**  
Nashville District, Regulatory (OP-F); KYTC Proposed Lake Barkley Bridge on US 68/KY 80 in Trigg County, KY; File# LRN-2011-00103
- D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: (USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)**  
State: KY County/parish/borough: Trigg City: near Canton  
Center coordinates of site: Lat. 36-47-57.82°; Lon.-87-58-31.86°  
Universal Transverse Mercator:  
Name of nearest waterbody: Cumberland River Mile 63.1  
Identify (estimate) amount of waters in the review area: ephemeral streams:  
Non-wetland waters: approx 750 linear feet: 0.5 to 2 width (ft) and/or acres.  
Cowardin Class:  
Stream Flow:  
Wetlands: acres.  
Cowardin Class:  
Name of any water bodies on the site that have been identified as Section 10 waters:  
Tidal:  
Non-Tidal: Cumberland River
- E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**  
Office (Desk) Determination. Date: 5 September 2014  
Field Determination. Date(s): 31 Jan 2014

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there "may be" waters of the of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

**SUPPORTING DATA.** Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- X Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:  
Info in application received in June 2014.
- X Data sheets prepared/submitted by or on behalf of the applicant/consultant.  
Office concurs with data sheets/delineation report.  
Office does not concur with data sheets/delineation report.

Data sheets prepared by the Corps:

Corps navigable waters' study:

- X U.S. Geological Survey Hydrologic Atlas: .  
USGS NHD data.  
USGS 8 and 12 digit HUC maps. 05130205; Lower Cumberland River Watershed
- X U.S. Geological Survey map(s). Cite scale & quad name: Canton, KY quad  
USDA Natural Resources Conservation Service Soil Survey. Citation:  
National wetlands inventory map(s). Cite name:  
State/Local wetland inventory map(s):  
FEMA/FIRM maps:  
100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- X Photographs: Aerial (Name & Date): Google Earth, Sep 2013  
or Other (Name & Date): Cumberland River Navigation Chart No. 9  
Previous determination(s). File no. and date of response letter:
- X Other information (please specify): Onsite inspection 31 Jan 2014

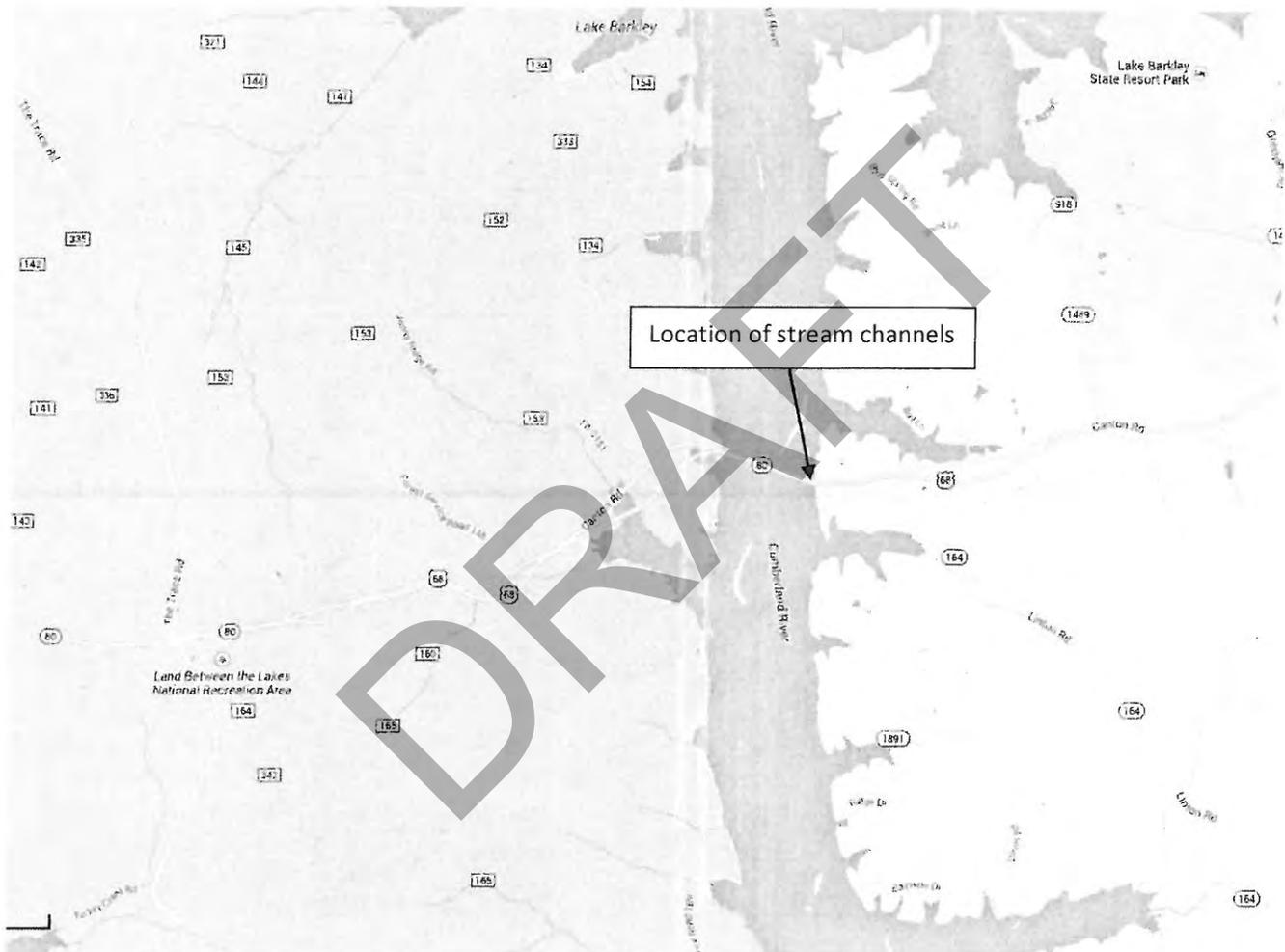
**IMPORTANT NOTICE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations:**



Signature and Date of  
Regulatory Project Manager  
(REQUIRED)

Signature and Date of  
person requesting preliminary JD  
(REQUIRED, unless obtaining  
the signature is impracticable).

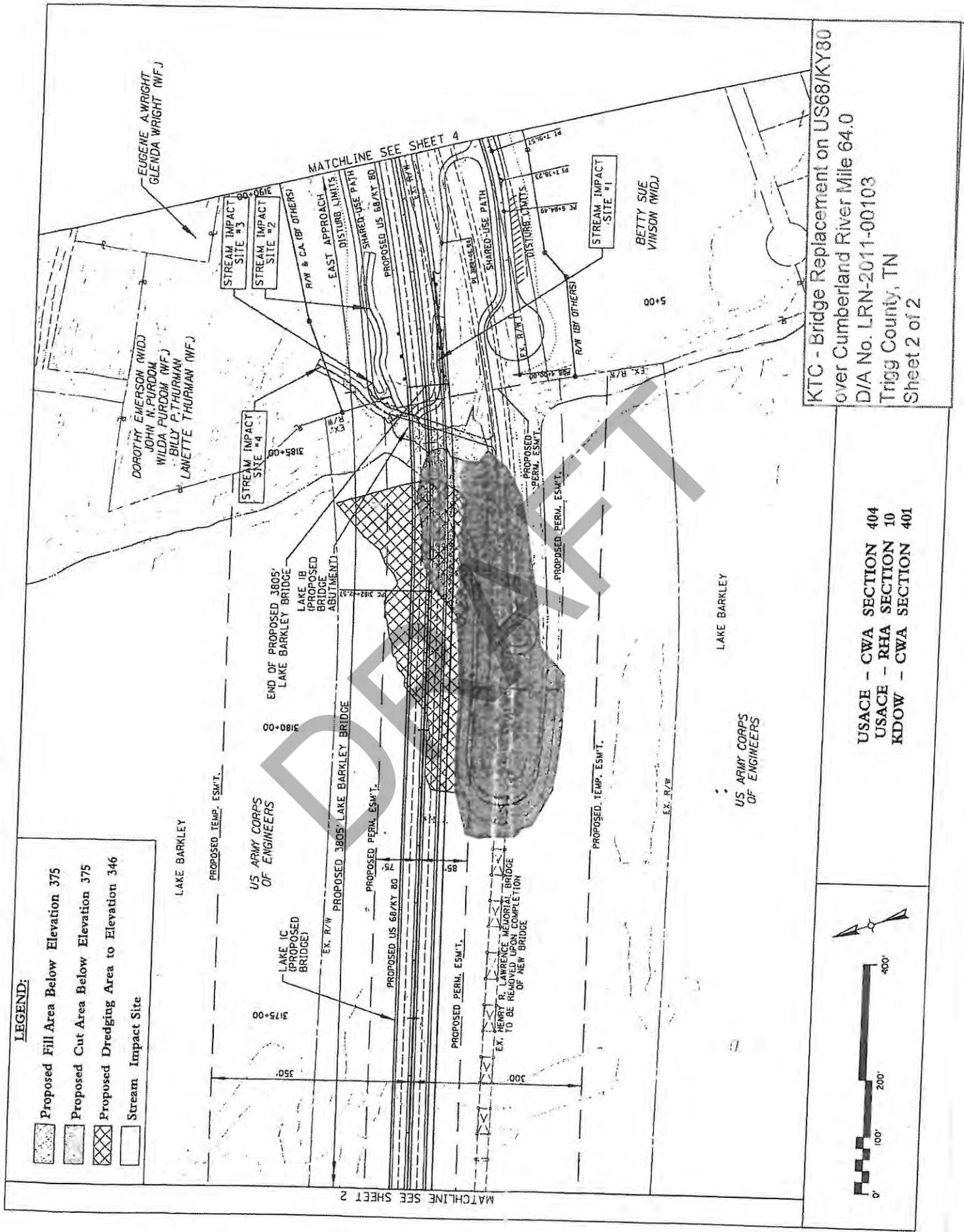




KTC - Bridge Replacement on US68/KY80  
over Cumberland River Mile 64.0  
D/A No. LRN-2011-00103  
Trigg County, TN  
Sheet 1 of 2

**LEGEND:**

-  Proposed Fill Area Below Elevation 375
-  Proposed Cut Area Below Elevation 375
-  Proposed Dredging Area to Elevation 346
-  Stream Impact Site



KTC - Bridge Replacement on US68/KY80  
 over Cumberland River Mile 64.0  
 D/A No. LRN-2011-00103  
 Trigg County, TN  
 Sheet 2 of 2

USACE - CWA SECTION 404  
 USACE - RHA SECTION 10  
 KDOW - CWA SECTION 401



## NAVIGATION DATA SHEET

**Information must be returned at least 10 business days in advance of your proposed start of construction.**

1. Permittee: Kentucky Transportation Cabinet

2. Permit Number: 2011-00103

3. Location (river, river mile, bank side, in the channel, outside the channel):

Cumberland River Mile 63.1, Barkley Lake, at the Lawrence Memorial Bridge, on SR-68/US-80 Highway Bridge, near Canton, Trigg County, Kentucky

Please complete the following information and return to:

U.S. Army Corps of Engineers, **Navigation Branch**

Estes Kefauver Federal Bldg, 801 Broadway, Nashville, TN 37203,

or fax: 615-736-5060; or email benton.w.ligon@usace.army.mil phone 615-736-7802

U.S. Army Corps of Engineers, **Regulatory Branch**

Attn: Amy Robinson, 3701 Bell Road, Nashville, Tennessee 37214,

or fax: (615) 369-7501; or e-mail: [amy.m.robinson@usace.army.mil](mailto:amy.m.robinson@usace.army.mil)).

4. What is the work being done or performed?

5. Who is doing the work? Contractor's name (Name and telephone number of responsible persons):

6. Starting and Estimated Finish Dates:

7. Days of Week work in progress with Hours of Operation:

8. Type of equipment (how many pieces, size and name of each):

9. Where will equipment be located during nonworking hours?

10. Information for Radios that will be used (Channel, Frequency Range):

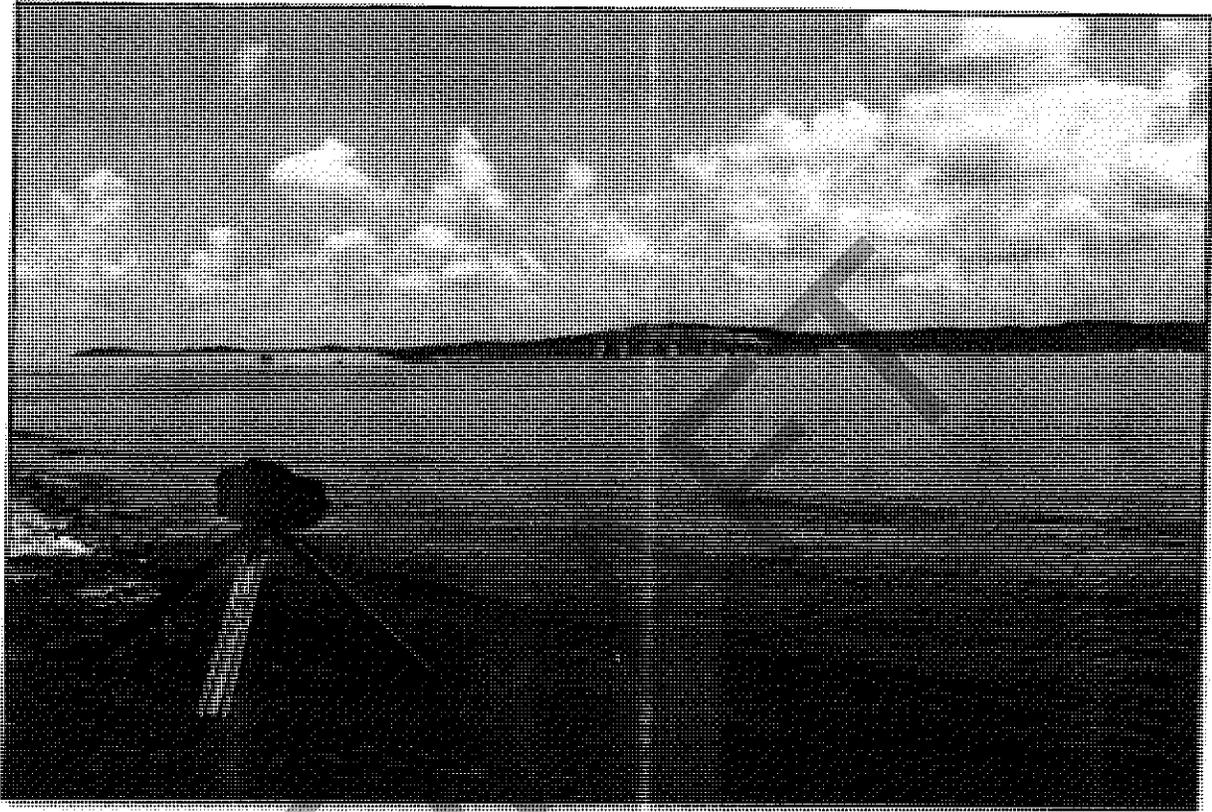
Name (please print) \_\_\_\_\_

Signature \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

**BIOLOGICAL ASSESSMENT  
FOR THE  
KYTC US-68 RECONSTRUCTION,  
TRIGG and MARSHALL COUNTIES, KENTUCKY  
KYTC Item 01-0180.10, .11, .51, .60 & .70**



**Prepared for:  
QK4 and Kentucky Transportation Cabinet**

**Prepared by:  
Eco-Tech Consultants, Inc.  
Louisville, KY**

**June 2012**





**BIOLOGICAL ASSESSMENT FOR THE KYTC US-68 RECONSTRUCTION  
TRIGG AND MARSHALL COUNTIES, KENTUCKY**

**TABLE OF CONTENTS**

**1.0 INTRODUCTION ..... 1**

    1.1 PROJECT DESCRIPTION..... 1

    1.2 ACTION AREA DESCRIPTION..... 1

    1.3 IDENTIFICATION OF LISTED SPECIES..... 2

**2.0 FEDERALLY LISTED SPECIES..... 4**

    2.1 GRAY BAT (*MYOTIS GRISESCENS*)..... 4

    2.2 INDIANA BAT (*MYOTIS SODALIS*)..... 7

**3.0 SURVEY METHODS ..... 13**

    3.1 LITERATURE AND OFFICE REVIEW ..... 13

    3.2 CAVE SURVEY METHODS..... 14

    3.3 BAT SURVEY METHODS..... 14

    3.4 FORESTED HABITAT IMPACT CALCULATION METHODS..... 16

**4.0 RESULTS ..... 17**

    4.1 LITERATURE AND OFFICE REVIEW ..... 17

    4.2 CAVE SURVEYS ..... 17

    4.3 BAT SURVEY ..... 17

**5.0 POTENTIAL EFFECTS ..... 20**

    5.1 POTENTIAL DIRECT/INDIRECT EFFECTS – GRAY BAT ..... 20

    5.2 POTENTIAL DIRECT/INDIRECT EFFECTS – INDIANA BAT ..... 25

    5.3 POTENTIAL CUMULATIVE EFFECTS ..... 27

**6.0 MITIGATION OF IMPACTS TO THREATENED/ENDANGERED SPECIES ..... 27**

    6.1 GRAY BAT ..... 27

    6.2 INDIANA BAT ..... 30

**7.0 CONCLUSIONS ..... 30**

**LITERATURE CITED..... 32**

List of Tables

- Table 1 USFWS endangered, threatened, and candidate species database results for Marshall and Trigg Counties, Kentucky
- Table 2 Configuration and location summary for mist net sites during the survey for the federally endangered Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) for the proposed US-68 reconstruction, Marshall and Trigg County, Kentucky
- Table 3 Bat species captured per night during a mist net survey for the federally endangered Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) for the proposed US-68 reconstruction, Marshall and Trigg County, Kentucky
- Table 4 Bat passes and Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) presence probabilities recorded each night at each acoustic monitoring station for the proposed US-68 reconstruction, Marshall and Trigg County, Kentucky
- Table 5 Determination of potential effects to federally listed species as a result of the US 68 Reconstruction Project.

List of Figures

- Figure 1 Project location
- Figure 2 Proximity to known habitat for federally-listed species (topographic map)
- Figure 3 Proximity to known habitat for federally-listed species (aerial photo)
- Figure 4 Potential habitat impacts for Indiana bats (topographic map)
- Figure 5 Potential habitat impacts for Indiana bats (aerial photo)

List of Appendices

- Appendix A Agency coordination concerning listed species
- Appendix B Mist net survey datasheets and results
- Appendix C Photographs of potential habitat, mistnet sites, acoustic set-ups, and bats
- Appendix D Supplementary bat capture table

## **1.0 INTRODUCTION**

Eco-Tech Consultants is pleased to submit the following Biological Assessment for a portion of the proposed US 68/KY 80 reconstruction from Cadiz, Trigg County to Aurora, Marshall County, Kentucky (Item #s 01-0180.10, .11, .51, .60, & .70). This document describes the likelihood of potential impacts to federally-listed species and their habitat as a result of the project. The assessment is required as part of environmental documentation activities as directed by the US Fish and Wildlife Service (USFWS), Federal Highway Administration, and Kentucky Transportation Cabinet (KYTC). The Biological Assessment process is outlined within the "Kentucky Transportation Cabinet/Division of Environmental Analysis Biological Assessment Format Guidance and Accountability Form" (TC 58-36, Rev. 6/05).

### **1.1 Project Description**

The Kentucky Transportation Cabinet (KYTC) has proposed a realignment of US-68 which will include construction of two new bridges across Lake Barkley and Kentucky Lake west of Cadiz in Marshall and Trigg Counties, Kentucky. The proposed reconstruction will start approximately one mile west of Cadiz at the intersection of Canton Rd. and US-68, will extend and end on the west side of the Lake Barkley bridge, and will also include the Lake Kentucky bridge (Figure 1). Prefabrication areas may involve tree clearing or road widening; however, these activities are currently planned to fall within the existing clearing limits. If prefabrication areas are necessary outside of the currently proposed clearing limits, potential effects of habitat alteration within these areas will be coordinated with USFWS personnel. The total length of the project includes 12 kilometers (7.5 miles) of roadway and two bridges. The proposed alignment generally travels east-west along the current US 68.

### **1.2 Action Area Description**

The proposed Biological Assessment area is in the Fairdealing, Fenton, Canton and Cadiz, Kentucky USGS 7.5-Minute Topographic Quadrangles. It is located along US-68, beginning approximately 1 mile west of Cadiz and ending west in Aurora (Figure 1). The main study area is contained within a 1 kilometer buffer surrounding the proposed centerline and encompasses approximately 3,678 hectares (9,089 acres). Additionally, coordination was sought for listed species and karst features in an area of 5 kilometers (30,773 hectares; 76,042 acres) around the construction area.

The action area is situated entirely within the Western Highland Rim Level IV subdivision of the Interior Plateau (71f) Level III Ecoregion as mapped by the US Environmental Protection Agency (Woods et al. 2002). This section of the Interior Plateau (71) consists of mixed hardwood forest (frequently oak-hickory) and rugged terrain. Streams tend to be cool and clear with moderate gradients and sand and gravel substrates. Average annual precipitation is 42-48 inches. Due to relatively infertile soils agriculture is limited in the area.

The proposed project area includes sections of Lake Barkley and Kentucky Lake, potential foraging habitat, and roosting habitat for bats. The project area is primarily located within forested areas within close proximity to Land Between the Lakes National Recreation Area. The

immediate surrounding area is also primarily forested with some residential and agricultural development. Karst features are relatively rare in the area, with no named caves within the action area. Sinkholes and springs are present, but the majority of these are located at the eastern end of the project area.

### 1.3 Identification of Listed Species

Letters requesting information regarding federally-listed species and their habitat within five kilometers of the proposed centerline were sent in August of 2011. The Kentucky State Nature Preserves Commission (KSNPC) provided a list of federally listed species known to occur within five miles of the proposed alignment. The USFWS has not responded to date, but does provide a list of threatened, endangered, and candidate species for Kentucky counties on the Kentucky Ecological Services Field Station website (USFWS 2008). The Kentucky Department of Fish and Wildlife Resources (KDFWR) provided a list of federally- and state-listed species known from the area. Copies of occurrence request letters can be found in Appendix A. These lists were collated to provide information on federally-listed species with potential to occur in Trigg and Marshall Counties (Table 1).

According to the KSNPC, two federally endangered mammal species, Indiana bat (*Myotis sodalis*) and gray bat (*Myotis grisescens*) are known to occur within ten miles of the proposed alignment. However, the known records of Indiana bats are more than five kilometers from the alignment. The federally endangered gray bat is known from within the 1km of the project area. KDFWR also listed gray bats as known to occur from the project area. In addition to the two mammal species, the USFWS lists four federally endangered mussel species known to occur in Marshall and/or Trigg Counties: the clubshell (*Pleurobema clava*), orangefoot pimpleback (*Plethobasus cooperianus*), pink mucket (*Lampsilis abrupta*), and ring pink (*Obovaria retusa*). One other federally endangered mussel species, the fanshell (*Cyprogenia stegaria*), has no known occurrences within these counties, but has the potential to occur based on historic range, proximity to known occurrence records, and biological and physical characteristics present in the study area. Two recently-listed species, the spectaclecase (*Cumberlandia monodonta*) and sheepsnose (*Plethobasus cyphus*), also have the potential to occur within Marshall and Trigg Counties.

The USFWS lists one federally-endangered bird, the least tern (*Sterna antillarum*), as known from Marshall County. In addition, the delisted bald eagle (*Haliaeetus leucocephalus*) is known from Marshall and Trigg Counties.

The USFWS and KSNPC listed one federally threatened herbaceous plant species, Price's potato-bean (*Apios priceana*), as occurring in Trigg County and having the potential to occur in Marshall County (Table 1).

**Table 1.** USFWS endangered, threatened, and candidate species database results for Marshall and Trigg Counties, Kentucky, with additional occurrence information from KSNPC and KDFWR.

Scientific Name	Common Name	USFWS County Occurrence	USFWS County Occurrence Status	Federal Status	State Agencies Reporting this Species
<b>Plants</b>					
<i>Apios priceana</i>	Price's potato-bean	Marshall/Trigg	Potential/Known	Threatened	KSNPC-known with 1km of centerline
<b>Invertebrates</b>					
<i>Cumberlandia monadonta</i>	spectaclecase	Marshall	Potential	Endangered	
<i>Cyrogenia stegaria</i>	fanshell	Marshall	Potential	Endangered	
<i>Lampsilis abrupta</i>	pink mucket	Marshall	Known	Endangered	
<i>Micropharus americanus</i>	American burying beetle	Trigg	Historic	Endangered	
<i>Obovaria retusa</i>	ring pink	Marshall/Trigg	Known/Known	Endangered	
<i>Plethobasus cooperianus</i>	orangefoot pimpleback	Marshall/Trigg	Known/Known	Endangered	
<i>Plethobasus cyphus</i>	sheepnose	Marshall	Potential	Endangered	
<i>Pleurobema clava</i>	clubshell	Marshall	Known	Endangered	
<b>Mammals</b>					
<i>Myotis sodalis</i>	Indiana bat	Marshall/Trigg	Potential/Known	Endangered	KSNPC-known within 10mi of centerline
<i>Myotis grisescens</i>	gray bat	Marshall/Trigg	Potential/Known	Endangered	KDFWR-known within 1km of centerline; KSNPC-known within 5km of centerline
<b>Birds</b>					
<i>Sterna antillarum</i>	Interior Least Tern	Marshall	Known	Endangered	
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Marshall/Trigg	Known/Known	Delisted	KSNPC-known with 5km of centerline

Eco-Tech ecologists used life history information, agency records, and knowledge of habitat within the project area to determine the likelihood of occurrence for each species. Other than the lakes, no streams of sufficient size to support freshwater mussels will be crossed by the proposed alignment, and it was previously determined that all listed mussel species have been eliminated from Kentucky Lake and Lake Barkley due to impoundment (Blalock and Sickel 1996; Sickel et al. 2007). Therefore, no mussel species are considered in this biological assessment. No sandbars providing suitable least tern nesting habitat will be crossed by the proposed alignment; therefore, any potential effects to this species will be discountable. There is a KSNPC record of Price's potato-bean within the 1-km buffer; however, previous surveys for this species yielded no occurrences in the project area (Palmer Engineering 2002). Additionally, KSNPC Botanist Deborah White has conducted an extensive number of surveys over multiple years in the area without finding additional populations of this species (personal communication Deborah White via Barry Nichols). Therefore, the initial list of federally-listed species was condensed to two bat species for biological assessment.

## 2.0 FEDERALLY LISTED SPECIES

### 2.1 Gray Bat (*Myotis grisescens*)



#### **Species Status**

The gray bat was listed as a federally endangered species on April 28, 1976 by the USFWS (1982); affording it protection under the ESA of 1973 (Public Law 93-205), as amended. USFWS biologists (i.e. the recovery team) subsequently developed and released a recovery plan several years later. Five primary causes for the decline in gray bat populations are outlined in the recovery plan: 1) direct human disturbance to individuals, 2) human disturbance to the environment, 3) destruction of roost caves by collapse or river impoundment, 4) cave commercialization, and 5) natural sources of mortality. Following the protection of hibernacula and maternity caves from human disturbance, gray bat populations started to recover at all the protected caves. Harvey (2001) reported a population increase of 16.5 percent since the time of listing. Due to the increase in numbers throughout their range, it was proposed in 2002 that the gray bat's status be reclassified ("downlisted") from endangered to threatened (Department of Interior 2002).

However, white-nose syndrome (WNS), a fungal disease first found in cave-hibernating bats during the winter of 2006-2007, presents a severe threat to gray bats. Having been found originally in New England, this malady has caused precipitous declines in bat populations in the

eastern U.S. In subsequent years, the fungus associated with WNS (*Geomyces destructans*) has been found in bats within the primary hibernating range of gray bats. Although WNS has been found in few gray bats to date, the range of this disease continues to rapidly expand and it will likely affect all cave-dwelling bats (USFWS 2012).

### **Distribution**

The range of the gray bat is restricted to the cave regions of Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri, Oklahoma, Tennessee, and Virginia (Barbour and Davis 1969). Most of the large concentrations of gray bats occur in Alabama, Kentucky, Missouri, and Tennessee. The majority (95%) of the range-wide population hibernates in nine Priority 1 hibernacula (sites that currently and/or historically contained more than 25,000 individuals), which are located in Alabama (one site), Arkansas (one site), Kentucky (one site), Missouri (three sites), and Tennessee (three sites) (USFWS 1982).

### **Description**

Gray bats are a member of the *Myotis* genus. The gray bat typically weighs 8-16 grams with a wingspan of 11-12 inches. Its diet consists primarily of insects. Water resources provide important hunting grounds. Unlike other *Myotis* species, the gray bat's wing membrane connects to its ankle instead of at the toe, and there is a prominent notch in its toe claws. Its fur is unicolored on the back and ranges in color from dark gray to chestnut brown or russet.



Notched claw

### **Habitat Requirements**

Gray bats are year-round cave residents; however, they inhabit caves with different temperatures in the summer and winter months (Gore 1992). During winter months, gray bats hibernate in caves that are cooler than summer caves and have temperatures of 42 to 52 °F (Harvey et al. 1999). These bats typically hibernate in large groups and hang loosely with their forearms stuck out at angles, rather than parallel to the body (Barbour and Davis 1969).

Prior to entering hibernacula, gray bats will swarm at the entrance of the cave (USFWS 1982), and individuals return to the same hibernaculum every year (Tuttle 1976a). Reproductively active females leave their summer habitat and arrive at the caves in September before males and juveniles arrive in October (Tuttle 1976a). By this time, males will be reproductively active and copulation takes place upon arrival at the cave (USFWS 1982). The majority of mating occurs in October and November (Barbour and Davis 1969). Females enter hibernation immediately after mating occurs, while males and some juveniles may stay active until early November (USFWS 1982). Supplemental copulation may occur during the period of hibernation (Guthrie 1933, Hall 1962, Miller 1939, Mumford 1958, Saugey 1978).

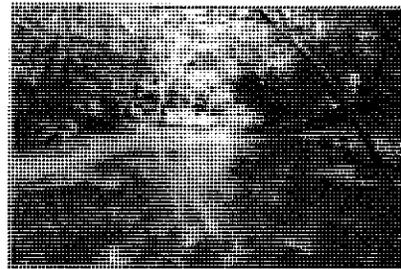
Gray bats may migrate long distances to and from their hibernacula. Hall and Wilson (1966), documented that gray bats would travel as far as 126 miles from a summer cave to a hibernaculum, when a bat banded in Hardin County, Illinois was recovered at Coach Cave in Edmonson County, Kentucky. Tuttle (1976a) found that the bats may travel 11 to 272 miles to

and from hibernacula. Hall and Wilson (1966) point to the small number of hibernacula for a relatively wide-ranging species to account for this difference in migration distances.

Following six to seven months of hibernation, adult females emerge in late March or early April, followed by juveniles and adult males (Tuttle 1976a). During autumn and spring migration, gray bats may roost temporarily in caves, referred to as transitional caves, which may not otherwise be used for maternity or hibernation (Tuttle 1976a). Individuals or groups of gray bats may inhabit transitional caves for brief periods in March through April, and September through October before moving to summer roosts or hibernacula (Barbour and Davis 1969, Tuttle 1976a). Migration distances up to 326 miles have been reported (Tuttle 1976a).

Females congregate in maternity caves and give birth to a single young in late May or early June (Tuttle 1976b). Most males and non-reproductive females utilize non-maternity caves during this part of the summer (Thomas 1994). Maternity colonies may contain tens of thousands of females and their young (USFWS 1982). These caves are vulnerable to human disturbances because gray bats will fly from their roost sites quickly, knocking young to the floor (Tuttle and Stevenson 1977). If disturbances continue, gray bats will abandon nursery roosts (Barbour and Davis 1969, Tuttle and Stevenson 1977). Most young are volant within 20–25 days of birth (Saughey 1978). Lactation typically ends by late July, and most females and juveniles subsequently leave the maternity caves (LaVal and LaVal 1980).

During late July and August, gray bats of mixed ages and sexes roost in caves throughout the summering area, and frequently move among caves in the home range of the colony (LaVal and LaVal 1980, Thomas 1994). In September, females begin to congregate at transitional caves, and by the end of the month most females have left to return to hibernacula (Gore 1992, LaVal and LaVal 1980). Most male gray bats leave summer habitat by November, although a small number of males may remain in transitional caves through winter (LaVal and LaVal 1980, USFWS 1982). Mating occurs after autumn migration when gray bats arrive at hibernacula (Barbour and Davis 1969, USFWS 1982). Females store sperm through the winter and fertilization is delayed until after emergence from hibernation (Guthrie and Jeffers 1938).



Typical summer foraging habitat for gray bats (*Myotis grisescens*)

Each summer colony occupies a home range that often contains several roost caves (Thomas 1994, Tuttle 1976a). Female gray bats often return to the same summer range each year (Tuttle 1976b). The colony home range may encompass up to 40 miles of river or reservoir shoreline (USFWS 1982). Thomas and Best (2000) found that gray bats in the Guntersville Reservoir area of northern Alabama had large home ranges with a minimum average size of 37.5 square miles. Individually, the bats are loyal to the colony home range, but may roost in several caves within the range (Goebel 1996, Tuttle 1976a, USFWS 1982).

Upon emergence from roosts, gray bats typically follow a stream path to foraging areas (Tuttle 1976b), though they may fly directly over land with little hydrological features to reach foraging areas (Thomas 1994). Foraging areas consist of water bodies (streams, reservoirs, lakes, wetlands), and adjacent riparian vegetation along wide sections of rivers (LaVal et al. 1977, Mitchell and Martin 2002, Rabinowitz and Tuttle 1982). Newly volant young often forage in forests that provide feeding cover surrounding the maternity cave (USFWS 1982). Both large and small perennial streams provide suitable foraging habitat for gray bats (LaVal et al. 1977). Forested riparian zones may improve the suitability of a river or reservoir for foraging gray bats. For example, at one reservoir in Tennessee, gray bats typically were observed foraging over portions of the reservoir with slab rock bottom and forested riparian zones (USFWS 1982). In Missouri, a higher proportion of gray bats foraged along wooded bluffs than near cleared agricultural fields (LaVal et al. 1977, LaVal and LaVal 1980). Gray bats were also found foraging over wetland depressions at Arnold Air Force Base in Tennessee (Mitchell and Martin 2002).

Gray bats may fly great distances during nightly foraging trips (USFWS 1982). Tuttle (1976a) indicated gray bats regularly made trips of 9–21 miles in a single night. In Tennessee, gray bat foraging territories were identified up to 12 miles from the roost cave. In Missouri, gray bats were observed foraging as far as 12 miles from their roost cave, and other individuals traveled approximately 15 miles to reach a foraging area over a large lake (LaVal and LaVal 1980). In Alabama, gray bats foraged 3–13 miles from the roost cave (Goebel 1996).

During summer, gray bats (especially males and juveniles) have also been found day and night roosting under bridges (Johnson et al. 2002). Bridges may be important resting places during foraging for gray bats because of the long distances they travel. Moreover, bridges provide a thermal refuge due to their tendency to retain radiant heat better than other types of night roosts (Johnson et al. 2002).

## 2.2 Indiana Bat (*Myotis sodalis*)



### **SPECIES STATUS**

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates in caves and abandoned mines during winter and spends the summer season in forested areas. It was listed as an endangered species on March 11, 1967 by the USFWS. However, the Indiana bat did not receive protection until enactment of the Endangered Species Act (ESA) in 1973 (Public Law 93-205), as amended. Critical habitat for the species was designated on September 24, 1976; it consisted of 11 caves and two mines in six states. Several years following its listing, an Indiana bat recovery plan was developed by biologists (i.e., the recovery team), which outlines habitat

requirements, critical habitat, potential causes for declines, and recovery objectives. The recovery plan was reviewed and published by the USFWS in 1983 (Brady et al. 1983). An agency draft of a revised plan was published in 1999, but it was never finalized. The Indiana bat recovery team is currently utilizing new information and making revisions to the recovery plan (USFWS 2007).

Estimated Indiana bat populations consistently declined from 1965 to 2001. This wide scale decline can be attributed to several causes including human modifications to hibernacula and surrounding areas, disturbance and vandalism of hibernacula, natural catastrophes, and threats to summer habitat and migration pathways, including loss and degradation of forested habitat (USFWS 2007). Even with the discovery of many new, large hibernacula, the range wide population estimate dropped approximately 57 percent from 1965 to 2001. However, estimates of range wide Indiana bat populations from surveys conducted post-2001 have increased. In 2005, a 15% population increase was estimated, yielding an approximate total of 457,000 Indiana bats (USFWS 2007). The USFWS views the apparent upward population trend as viable because the same surveyors have been consistently conducting the winter surveys at all large hibernacula over the past 20 years. Moreover, recent, large increases in local populations at 34 known high-priority hibernacula have been observed. The USFWS (2007) anticipates that planned improvements in hibernacula survey methodology will provide an increased confidence level in the overall population trend.

#### **DISTRIBUTION**

The Indiana bat's range includes most of the eastern United States. It is known to occur from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida (Barbour and Davis 1969, Gardner and Cook 2002). The species' range is generally consistent with the presence of limestone caves that serve as hibernacula in the winter (Menzel et al. 2001). According to the USFWS (2007) winter survey results from 2005 indicated that there were 23 Priority 1 hibernacula in seven states; including Illinois (one site), Indiana (seven sites), Kentucky (five sites), Missouri (six sites), New York (two sites), Tennessee (one site), and West Virginia (one site). Over 90 percent of the estimated range wide Indiana bat population hibernates in only five states: Indiana (45.2%), Missouri (14.2%), Kentucky (13.6%), Illinois (9.7%), and New York (9.1%).

Indiana bats are known to migrate up to 360 miles from their hibernacula to find suitable summer habitat to raise offspring (Kurta and Murray 2002, Winhold and Kurta 2006). However, some migrate much shorter distances as evidenced by banded female Indiana bat recoveries from maternity colonies at Mammoth Cave National Park. Moreover, recent radio-telemetry studies in New York found that of 70 Indiana bats emerging from three hibernacula, most migrated to summer habitat only 40 miles away (USFWS 2007). It was previously thought that the entire species, with the exception of some males, migrated north and west from their hibernacula to forested areas in Missouri, Indiana, Kentucky, Iowa, Ohio, and Michigan during the summer (Barbour and Davis 1969). This migration pattern was illustrated by Barbour and Davis (1969), with summer band recoveries near the Wayne National Forest in southern Ohio of both male and female bats banded at Carter Caves State Resort Park, in Carter County,

Kentucky. In addition, reproductive Indiana bats have now been documented in the following states: Arkansas, Illinois, Indiana, Iowa, Kentucky, Michigan, Maryland, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia (USFWS 2007).

Although Indiana bat maternity colonies occur throughout much of the mideastern United States (e.g., West Virginia, Virginia, Pennsylvania, New York), they appear to be relatively less abundant in these peripheral portions of their range (USFWS 2007). The regional differences in summer distribution and relative abundance are likely influenced by geographic distribution of important hibernacula and also by regional climate and elevation variation (USFWS 2007, Brack et al. 2002). Therefore, the understanding of how and to what extent these factors influence the distribution and abundance of maternity colonies is still evolving (USFWS 2007).

#### ***AUTUMN AND WINTER HABITAT***

Indiana bats use sloughing bark and cracks in dead, partially dead, and live trees as day roosts during autumn (Kiser and Elliott 1996, MacGregor et al. 1999). Autumn roost trees range from 4.7 to 26.4 inches in diameter at breast height (dbh) and occur in forested, semi-forested, and open habitats (Kiser and Elliott 1996). Depending on local weather conditions, Indiana bats normally enter the hibernaculum in October and remain there through April (Hall 1962, LaVal et al. 1977, LaVal and LaVal 1980).

Prior to entering the hibernacula in autumn, swarming occurs at the entrances of either the hibernacula (Cope and Humphrey 1977) or other caves located near the hibernacula (LaVal et al. 1977). Swarming usually lasts for several weeks (August - September) and mating occurs toward the end of this period. Mated females usually enter directly into hibernation, whereas males may remain active through the end of November. Reproductive females store sperm through the winter, delaying fertilization until early May. During April and May the majority of the Indiana bat population emerges, leaving their cave areas to find suitable summer habitat. However, some male and non-reproductive female Indiana bats will remain near the hibernacula during the summer. Females usually start grouping into larger nursery colonies by mid-May and give birth to a single young between late June and early July (Easterla and Watkins 1969, Humphrey et al. 1977).

Indiana bats hibernate primarily in caves, but they have also been documented using abandoned mines. As of November 2006, the USFWS (2007) has winter records of 281 distinct hibernacula in 19 states that have been occupied continually since 1995. According to Barbour and Davis (1969), temperature and relative humidity are important factors in the selection of hibernation sites. During early autumn, Indiana bats roost in warm sections of caves and move to lower temperature areas of the cave as outside temperatures decrease. In mid-winter Indiana bats tend to roost in portions of the cave where temperatures are cool (37° to 43°F). Relative humidity in Indiana bat hibernacula tends to be high, usually above 74 percent, but not exceeding saturation (Hall 1962, Humphrey 1978, Kurta and Teramino 1994, LaVal et al. 1976).

#### ***SUMMER HABITAT***

Selection of roost trees by Indiana bat colonies are based on structural characteristics. Tree diameter, solar exposure, and height in canopy are among the most important (Romme et al. 1995, Kurta and Murray 2002). Male and female Indiana bats inhabit different habitats and choose roost trees with differing characteristics during the summer months (Kurta 2005). Reproductive females tend to choose roosts in mature forests with large trees, scattered gaps in the canopy, and an open understory (Gardner et al. 1991b, Callahan et al. 1997). The number of available roost trees in an area influences the suitability of habitat for female Indiana bats (Kurta, 2005). Gardner et al. (1991b) found that of 39 roost trees evaluated, 31% were not suitable the following summer, and that 33% of the remaining trees were unavailable for use after two summers. Thus, roost trees are an ephemeral resource.

Maternity colonies have been found under sloughing bark of dead, partially dead and live trees (Carter 2003, Gardner et al. 1991b, Kurta et al. 1993, Kurta et al. 2002, Romme et al. 1995). These colonies have been found in lowland forests (Cope et al. 1974, Humphrey et al. 1977), and more recently in upland forests (Callahan et al. 1997, Clark et al. 1987, Gardner et al. 1991b, Kiser et al. 2002). Such colonies are usually located in large-diameter, standing dead trees, with direct exposure to sunlight (Callahan et al. 1997). Maternity roosts can contain over 350 individual bats during July and August (Kiser et al. 1998). During Callahan's study (1997), he arranged roost trees into two groups depending on the intensity of use and size of the colony that used each tree. Callahan (1993) classified any tree that was used more than once by greater than 30 bats each time as a primary roost tree, and any tree with less than 30 bats or used only once as an alternate roost tree. The primary roost trees had an average dbh of 22.4 inches, while open snags used as alternate roosts had an average dbh of 20.9 inches (Callahan et al. 1997).



Example of a potential roost tree for Indiana bats (*Myotis sodalis*).

Indiana bats require more than one roost tree to fulfill their needs during the summer (Callahan et al. 1997). Barclay and Kurta (2004) found one maternity colony that used 18 roost trees during a single summer. In addition, Indiana bats are known to roost in several different species of trees, selecting roost trees by the structural composition of each tree. Farmer et al. (1997) contends that structure is probably more important than tree species in selection of roost trees.

Twelve tree species are listed in the Habitat Suitability Index Model (Romme et al. 1995) as primary species (class 1 trees). The trees listed by Romme et al. (1995) include: silver maple (*Acer saccharinum*), shagbark hickory (*Carya ovata*), shellbark hickory (*C. laciniosa*), bitternut hickory (*C. cordiformis*), green ash (*Fraxinus pennsylvanica*), white ash (*F. americana*), eastern cottonwood (*Populus deltoides*), northern red oak (*Quercus rubra*), post oak (*Q. stellata*), white oak (*Q. alba*), slippery elm (*Ulmus rubra*), and American elm (*U. americana*). In addition to these species, Romme et al. (1995) listed sugar maple (*A. saccharum*), shingle oak (*Q. imbricaria*), and sassafras (*Sassafras albidum*) as class 2 trees. The class 2 trees are those

species believed to be less important, but still have the necessary characteristics to be used as roosts. Trees normally used as primary roosts are dead and have a dbh greater than 12 inches (Romme et al. 1995).

At least 33 tree species have been found to be roosts for reproductive female Indiana bats, and 87 percent of them are ashes (13%), elms (13%), hickories (22%), maples (15%), poplars (9%), and oaks (15%; USFWS 2007). It was previously believed that oak and hickory were used more commonly in the southern portion of the range (Callahan et al. 1997, Gardner et al. 1991b), and elm, ash, maple, and cottonwood were occupied more often in northern areas (Kurta et al. 1996, 2002; Whitaker and Brack 2002). However, more recent research reveals that Indiana bats occupy ash and elm most often in southern Illinois (Carter 2003) and hickories most often in Vermont (Palm 2003). Therefore, it appears that tree species use is more closely related to local availability and suitable structure than to broad regional preferences (USFWS 2007). Nonetheless, some common trees, such as American beech (*Fagus grandifolia*), basswood (*Tilia americana*), wild black cherry (*Prunus serotina*), box elder (*A. negundo*), and willow (*Salix* spp.), are rarely to never used, suggesting that they are typically not acceptable even when suitable structure is present, especially as a primary roost (USFWS 2007).

Most (97%) roost trees of female Indiana bats at maternity sites are deciduous species, except for a few coniferous trees discovered in the Great Smoky Mountains (Harvey 2002, Britzke et al. 2003) and in New England (Palm 2003). This more likely reflects availability rather than a preference for deciduous trees (USFWS 2007).

#### **FOOD HABITS**

Historically, the Indiana bat was thought to prey primarily on moths (Lepidoptera), beetles (Coleoptera), true flies (Diptera), and caddisflies (Trichoptera) (Belwood 1979, Brack 1983, Brack and LaVal 1985). During a study by Belwood (1979), the primary insects consumed by females and juveniles in southern Indiana were Lepidoptera (57%), Diptera (18%), and Coleoptera (9%). Belwood's information was very similar to a three-year study conducted by Brack (1983) throughout Indiana. Brack (1983) found that Indiana bats consumed Lepidoptera (48%), Coleoptera (24%), and Diptera (8.5%). He also found Trichoptera (9.8%) to be an important food source. Studies by Lee (1993) and Kurta and Whitaker (1998) found that the same four insect orders were consumed by Indiana bats in central/northern Indiana and in Michigan. However, these studies showed that Indiana bats preyed much more heavily on caddisflies in central/northern Indiana and in Michigan. The female Indiana bats in central and northern Indiana consumed Lepidoptera (40%), Trichoptera (29%), Coleoptera (13%), and Diptera (9%) (Lee 1993). The most recent Indiana bat food habits study was conducted in Michigan at the northern limits of the species' range. These bats consumed primarily Trichoptera (55.1%) and Diptera (25.5%), which have aquatic larvae (Kurta and Whitaker 1998). These authors hypothesized that Indiana bats in northern portions of their range feed more on aquatic insects than southern populations because they forage primarily over streams and wetlands.

The only food habit information from Kentucky for Indiana bats is from Jackson County. Kiser and Elliott (1996) conducted a study to determine the food habits of male Indiana bats at a cave entrance. During the autumn of 1994 and 1995, male Indiana bats consumed primarily Lepidoptera (28.5% and 34.0%), Coleoptera (15.9% and 40.2%), Homoptera (15.3% and 4.5%), and Diptera (28.8 % and 18.8%). The increase in consumption of snout beetles (Coleoptera: Curculionidae) during the 1995 samples indicates that Indiana bats are opportunistic foragers (Kiser and Elliott 1996).

Indiana bats forage primarily in forested habitats (Cope et al. 1974, Humphrey et al. 1977, LaVal et al. 1977, Belwood 1979), but they will also forage in edges of forests and croplands, fallow fields, and areas of impounded water (Gardner et al. 1991a). Indiana bats may utilize as many as four different foraging areas during nightly foraging (Murray 1998), using the same travel corridor each night to move from the roost tree to the foraging areas. It has been documented that Indiana bats may travel up to three miles from their summer roosts to summer foraging areas and will visit these same areas each night. Reproductively active females traveled a maximum mean distance of 1.5 miles from their roost trees to foraging areas in Illinois (Gardner et al. 1991a). During a study by Pruitt et al. (1995) at the Jefferson Proving Ground (JPG), Jefferson County, Indiana, reproductive female bats were found to travel a mean distance of 1.7 miles from their original capture sites to their roost trees. Also at JPG, a male traveled 0.4 mile from the capture site to its roost; this distance is less, but similar to the distance of 0.7 mile found by Gardner et al. (1991a) for males in Illinois.

#### **WHITE-NOSE SYNDROME (WNS)**

White-nose syndrome (WNS) has been characterized as a condition affecting hibernating bats and was named for the white fungal growth located on hairless areas of the body such as the muzzle, ears, and/or wing/tail membranes (Blehert et al. 2008). Behavioral responses to WNS include movement to entrances of hibernacula, day flight during mid-winter, cluster formation on the ground, and other uncharacteristic winter/hibernating behavior. Bats affected with WNS are thought to leave their hibernacula early in search of food and, subsequently, starve or freeze to death.

WNS was first documented by a photograph taken at Howes Cave, approximately 32 miles west of Albany, New York in February 2006 (Blehert et al. 2008). A caver photographed hibernating bats with an unusual white substance on their muzzles and observed several dead bats (USFWS 2009a). The following winter, New York Department of Environmental Conservation biologists documented WNS after observing bats exhibiting abnormal behavior, a white, powdery substance on the muzzle, and a few hundred dead bats in several caves in the Albany, NY area (USFWS 2009). Since then sick, dying and dead bats have been found in unprecedented numbers in and around caves and mines from Vermont to Virginia.

WNS has killed hundreds of thousands of bats across the northeast and east during the past three years and continues unchecked (USFWS, 2009b). It has rapidly spread to over 90 sites and has been associated with the deaths of over 5.5 million bats in the United States and Canada (USFWS 2012). In some hibernaculum, 90 to 100 percent of infected bats are dying.

(USFWS 2009). Since the 2010-2011 winter, WNS has spread to 16 states and four Canadian provinces including: Connecticut, Indiana, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, New Brunswick (CAN), Nova Scotia (CAN), Ontario (CAN), and Quebec (CAN; USFWS 2012). WNS threatens to spread further into the Midwest, Southeast, and West which are home to many federally endangered bat species as well as some the largest known bat populations in the country (USFWS 2009).

Researchers associate WNS with a newly identified fungus (*Geomyces destructans*) that thrives in the cold and humid conditions characteristic of the caves and mines used by bats (USFWS 2009c). However, it is not yet known if the fungus is the cause of mortality or if it is a symptom of something else. Biologists believe that affected bats may be waking up more often throughout hibernation to groom themselves leading to an increased use of fat reserves needed for winter hibernation. Bats with obvious WNS have shown noticeable agitation and excessive grooming. However, once clean the bat will re-enter torpor allowing the fungus to re-establish. Cryan et al. (2010) suggested the fungus might directly interfere with important physiological functions leading to disruptions in homeostasis, thermoregulation, and respiration while also increasing the risk of dehydration, among other things. Affected bats do not always exhibit the white fungus, especially after grooming, but do leave their hibernacula during the winter and typically die. The fungus isn't always visible to the unaided eye and usually is not seen on bats found flying or dead outside of their hibernacula or at their summer roosts. Bat species currently known to be affected by the fungus are little brown bat (*Myotis lucifugus*), Indiana bat, small-footed bat (*M. leibii*), northern long-eared bat (*M. septentrionalis*), tri-colored bat (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*).

The means of transmission of WNS is currently unclear; however, biologists believe that WNS is transmitted primarily from bat-to-bat. Evidence collected to date indicates that human activity in caves and mines may be assisting in the spread of WNS since some caves used by people have WNS affected bats, while other, nearby caves not used by people do not seem to be affected. It is likely that the fungus can be transported inadvertently from site-to-site on gear and boots of cave visitors (USFWS 2009a).

Human health implications are not known and there is no information indicating that people or other animals have been affected after exposure to the white fungus.

### **3.0 SURVEY METHODS**

#### **3.1 Literature and Office Review**

Eco-Tech coordinated with the USFWS, KY Speleological Survey (KSS), KY Department of Fish and Wildlife Resources (KDFWR), and KY State Nature Preserves Commission (KSNPC) to locate records of federally listed species and karst features known to occur within or near the project area (Appendix A). In addition, Eco-tech biologists used topographic maps, aerial photographs, Kentucky Geological Survey karst data, and prior surveys of the area to determine potential habitat for bats.

### **3.2 Cave Survey Methods**

Caves provide winter hibernacula for Indiana bats and year-round habitat for gray bats. Eco-Tech surveyed within a one kilometer buffer of the project's clearing limits for the presence of caves. A potential habitat survey was conducted during July and September of 2011. Mapped karst features were visited by at least two biologists. Had potential caves (openings greater than 1 foot square) been found, they would have been assessed by a qualified bat biologist (a person who holds a USFWS Recovery Permit for federally listed bats in Kentucky) adhering to Phase I Habitat Assessment protocols (USFWS 2011a).

### **3.3 Bat Survey Methods**

Potential summer roosting habitat for the Indiana bat exists along this reconstruction. Using aerial photographs and field verification, it was determined that 6.99 linear kilometers of suitable summer habitat will be impacted.

This survey was conducted in accordance with the guidelines of Appendix 5 of the "Indiana Bat Draft Recovery Plan: First Revision" (USFWS 2007) and "Indiana Bat Survey Guidance for Kentucky" (USFWS 2011a). These guidelines call for one net site to be netted for two calendar nights per kilometer of affected forested habitat for linear projects. Surveys must be conducted between June 1 and August 15 and are temperature and precipitation dependent. The desktop review found that 6.99 linear kilometers of forested habitat will be affected by this proposed project. Due to the fact that there are disjunct areas of habitat present on the shores of Kentucky Lake and Lake Barkley that may be affected by proposed construction, three additional mist net sites were located in these areas. We surveyed ten mist net sites along the proposed route. Four additional sites were surveyed as a result of the acoustic monitoring for a total of 14 mist net sites.

Mist net sites were chosen based on factors such as the presence of travel corridors and water, a relatively closed canopy cover, and potential access. The most current available aerial photography and topographic maps were utilized to determine the extent of tree clearing and presence or absence of potentially nettable features. Actual locations of mist net sites are depicted in Figures 4 & 5.

Each mist net site consisted of two net sets. One net set consisted of two to three mist nets hung between two poles. Poles were 20 to 30 feet high and had ropes affixed to them to raise and lower the nets. The mist nets used in this survey were constructed of 50 denier/2-ply nylon or monofilament, with a mesh size of 1.5 inches, and a length of 20 – 60 feet (Table 2). Net sets were located so that the entire open portion of the flyway was covered by the nets. Nets were tended from dusk and continued for a minimum of five hours. Mist nets were checked for bats every 10 minutes.

Upon capture, bats were removed from mist nets, identified to species, measured, and released unharmed at the capture site. Data recorded for each bat captured included species, age, gender, reproductive condition, right forearm length (RFA), wing scar score, and body weight. Bats were identified to species based upon distinctive morphological characteristics (e.g., body

size, hair color, ear length, tragus length and shape, presence/absence of a keeled calcar). Adult female bats were classified as reproductive if they were pregnant (determined by palpation of abdomen) or lactating (i.e., teats conspicuous and enlarged, lack of hair around teats). Male bats with testicles descended into the scrotum were considered reproductive. Juveniles were distinguished from adults by examining ossification (bone growth) in phalangeal joints.

**Table 2.** Configuration and location summary for mist net sites during the survey for the federally endangered Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) for the proposed US-68 reconstruction, Trigg County, KY

SITE	SURVEY DATES	# OF NETS	NET CONFIGURATION (h x w)	Lat	Lon	BATS CAPTURED
1	July 26-27, 2011	2	A) 30' x 60' B) 20' x 20'	36.76712	-88.13019	2
2	July 26-27, 2011	2	A) 20' x 20' B) 30' x 20'	36.77358	-88.10564	12
3	July 28-29, 2011	2	A) 20' x 20' B) 20' x 20'	36.80700	-87.98764	6
4	July 29-30, 2011	2	A) 20' x 30' B) 20' x 20'	36.80497	-87.96796	12
5	July 28,30, 2011	2	A) 30' x 20' B) 20' x 42'	36.80323	-87.93490	26
6	August 2-3, 2011	2	A) 20' x 20' B) 20' x 20'	36.80992	-87.92694	6
7	August 8-9, 2011	2	A) 20' x 20' B) 20' x 20'	36.80411	-87.91383	11
8	August 4-5, 2011	2	A) 20' x 20' B) 20' x 20'	36.81556	-87.90014	5
9	August 4-5, 2011	2	A) 20' x 20' B) 20' x 20'	36.84229	-87.87836	5
10	August 2-3, 2011	2	A) 20' x 42' B) 20' x 20'	36.83388	-87.85204	21
11	August 8-9, 2011	2	A) 20' x 20' B) 20' x 30'	36.80542	-87.73333	2
12	August 10-11, 2011	2	A) 20' x 30' B) 20' x 20'	36.80457	-87.96883	0
13	August 12-13, 2011	2	A) 30' x 20' B) 20' x 20'	36.80993	-87.92667	6
14	August 10-11, 2011	2	A) 20' x 20' B) 20' x 20'	36.83948	-87.87885	1

Weather conditions were documented each night to confirm that netting was conducted in accordance with Indiana Bat Recovery Team Guidance (USFWS 2007). The air temperature, wind speed, cloud cover, and precipitation were recorded at the beginning and end of each night of the survey. In addition, the phase of the moon was also recorded. A digital or mercury thermometer was used to record temperature. Wind speed, percent cloud cover, and moon phase were estimated (Appendix B). All sites were photographed and their location recorded using a handheld GPS unit.

All netting was conducted in accordance to bat handling/disinfection protocols for summer bat field studies, as dictated by state and federal agencies to help prevent the spread of White Nose Syndrome (USFWS 2011b).

Due to the inherent difficulty in capturing Indiana bats and determining their presence/absence within a specific area, acoustical monitoring equipment (Anabat SD2) was used to provide supplementary information to be used in the determination of effect. Ten anabat sites were

located in areas of suitable Indiana bat habitat that weren't conducive to mist net surveys. One Anabat SD2 detector was used at each anabat site. In some cases it was necessary to locate Anabat units relatively close to net sites because of landowner access and so that they may be observed to prevent theft. However, all Anabat units were placed greater than 100m away from net sites. The units were manually powered on and off in coordination with mist net activities (five hours). During nights with potential for rain, detectors were housed in weatherproof containers, mounted on tripods, and fitted with a 45° PVC elbow for microphone placement. Bat detectors were set in forest canopy openings or other open areas to isolate search phase calls of bats and avoid clutter calls.

Recorded data was retrieved from Compact Flash Cards. Acoustic files were filtered using Analook (Version 4.9j, Chris Corben) to remove extraneous environmental noise (insects, wind, etc.) using a smoothness of 12. Call parameters were extracted using the ID1 filter, and analyzed using Automated ID software developed by Eric Britzke as per the Kentucky Guidance (USFWS 2011a).

If interpretation of anabat data via the Automated ID program indicated 99 percent probability of Indiana bat presence, then an additional mist net site was located near where the anabat was located. Additional sites were not required for anabat results that indicated gray bat presence due to the fact that gray bats were captured during the survey.

Bat call enumeration can be somewhat misleading due to uncertainties about the behavior of the bats being recorded. Multiple calls from the same species may represent many separate individuals or multiple passes by a small number of individuals. As an indication of relative bat activity, we have included the number of files passing the noise filter in the anabat results table. This should not be considered an indicator of the number of individual bats in the area.

During a mist netting biologists made a preliminary assessment of the suitability of bridges within the project area for use by bats. However, assessment of the large bridges over Kentucky Lake and Lake Barkley was not possible due to access constraints. Big brown bats are known to roost in the bridge over Lake Barkley (see photos in Appendix C by Barry Nichols, KTC Division of Environmental Analysis), and the use of these bridges by gray bats is assumed due to their pervasiveness in the area.

### **3.4 Forested Habitat Impact Calculation Methods**

Forested areas provide roosting and foraging habitat for Indiana bats and foraging habitat for gray bats. In order to provide a thorough analysis of potential effects to suitable Indiana bat habitat, forested impacts were calculated within the project area. Eco-Tech biologists conducted a desktop review of the proposed action area using current aerial photography, topographic maps, and the proposed clearing limits provided by KYTC. Forested habitat was delineated within the clearing limits for the project using 2010 aerial photographs and prior knowledge of the area. A shapefile delineating forested habitat within the project area was produced using ESRI ArcMap Geographic Information System (GIS) software. A shapefile of the project's clearing limits was then used to clip the forested habitat polygon, thereby producing

an accurate calculation of forested habitat impacts within the project's clearing limits. No known Indiana bat swarming or maternity habitat exists within the clearing limits (Figures 2 & 3).

## **4.0 RESULTS**

### **4.1 Literature and Office Review**

Gray bats have been reported to occur within 5km of the survey area by the KSNPC and within the 1-km buffer by the KDFWR. KSNPC also noted within 10mi (16.1km) of the project area both Indiana bats and a federal species of management concern, the southeastern myotis (*Myotis austroriparius*). A cave known as gray bat habitat is located 5 to 10 miles from the project area. A small portion of the eastern section of the 5-km buffer falls within USFWS classified Indiana bat swarming habitat (USFWS 2011c), but the project centerline is not within known Indiana bat habitat.

During fieldwork conducted in 2002 Palmer Engineering biologists conducted mist net surveys at 20 sites in the vicinity of the project area capturing 376 bats, including 55 gray bats. No Indiana bats were captured. Six of Palmer's sites were within the project limits being considered in this BA. At those six sites they captured 166 bats, including 45 gray bats (Palmer Engineering 2002).

According to KGS mapping, there are 47 sinkholes within 1km of the clearing limits. These primarily fall in the eastern portion of the project area (Figures 4 & 5).

### **4.2 Cave Surveys**

Eco-Tech biologists searched 47 potential portals and two springs within a one kilometer radius of the project area. No potentially suitable hibernacula (i.e., openings greater than one square foot) for Indiana bats or gray bats were located. Thus, no emergence counts were conducted in the area.

### **4.3 Bat Survey**

Potential summer roosting habitat for Indiana bats was noted throughout the project area (Figure 4 and 5). Portions of the project area harbor hardwood forests with live trees and snags that could function as roost trees. Acreages of potential habitat impacts are detailed within the Direct/Indirect Effects section (Section 5.2).

A total of 14 sites were surveyed using mist nets from July 26 to August 13, 2011 within the proposed roadway reconstruction in Trigg County, Kentucky. Four of the sites (Sites 11-14) were sampled because Anabat sampling in those locations indicated 99 percent probability of Indiana bat presence. Sites were located along stream corridors, wooded trails, or forest/lake edges. Detailed descriptions and sketches of each net site are included in Appendix B. Photographs of net sites are included in Appendix C. Additional wildlife observed and general

comments about each net site are included on survey data forms in Appendix B and a brief synopsis of mist net sites surveyed is described below.

Site 1 was placed along the west side of Kentucky Lake in Lakeside Pavilion Kenlake State Resort Park. Net A was placed along the shoreline of the lake and extended outward into the water. Net B was placed along a wooded access trail connecting the lake with a recreation area above. The dominant tree species included white oak, sweetgum, and boxelder.

Site 2 was located near the Fenton Campground, just south of US-68 near the eastern shore of Kentucky Lake. One net was placed in an unnamed tributary to Kentucky Lake while the other was placed on a wooded trail. Tuliptree, slippery elm, and American sycamore (*Platanus occidentalis*) were the dominant overstory species.

Site 3 was placed along a forest road which runs east into the western shore of Lake Barkley. Net A was placed along the entrance to the road while Net B was placed over a rut containing water closer to the lake. Common canopy trees included post oak, Virginia pine (*Pinus virginiana*), and winged elm (*Ulmus alata*).

Site 4 was located along the eastern shoreline of Lake Barkley at the termination of Mound Road. Net A was placed across an inlet of the lake and Net B was placed along a wooded trail leading into the lake. Dominant canopy species included southern red oak, honey-locust (*Gleditsia triacanthos*), and silver maple.

Site 5 was located along a mostly dry streambed on the south side of US-68. Both nets were placed along the streambed. Net A was placed over a large pool while Net B was located a further up the dry streambed. American sycamore, black cherry, and black locust (*Robinia pseudoacacia*) were the dominant overstory species.

Site 6 was set on a wooded trail intersecting a prairie clearing near the entrance to Lake Barkley State Resort Park. Both nets were placed over ruts along the wooded trail on opposite sides of the clearing. Tuliptree, shagbark hickory, and sweetgum were the dominant overstory species.

Site 7 was located along a wooded stream situated between several agricultural fields along Deer Run Rd. just south of US-68. Both nets were placed over pools within the streambed. Dominant canopy species included black walnut, American sycamore, and sugar maple.

Site 8 was placed along a wooded forest road which intersects Apostle James Road just north of US-68. Both nets were set across the road. Post oak, southern red oak (*Quercus falcata*), and blackjack oak (*Q. marilandica*) were the dominant overstory species.

Site 9 was situated over a wooded stream dividing Riley Hollow Rd. from private property. Both nets were placed over pools in the stream. The dominant canopy species were American sycamore and sugar maple.

Site 10 was placed along a wooded stream corridor near a bridge along KY-1175 south of KY-80. Net A was placed over a pool along the west side of the bridge and was situated to cover the passage below the bridge. Net B was placed further east down the stream along the dry streambed. Dominant overstory species included boxelder, American sycamore, and slippery elm.

Site 11 was placed along a wooded forest road just north of US-68 running east into the western shore of Lake Barkley. Both nets were placed along this road. Dominant canopy species differed between net placements. The dominant canopy species at Net A were loblolly pine (*Pinus taeda*), American elm, and sweetgum while those at Net B were silver maple, American elm, and sweetgum. Site 11 was relocated on the second night to a point closer to the shoreline. Both nets were placed along the shoreline. At this point the dominant tree species were black willow (*Salix nigra*), silver maple, and river birch (*Betula nigra*).

Site 12 was located along the eastern shoreline of Lake Barkley at the termination of Mound Road. Net A was placed along the shoreline while Net B was placed along an old forest road leading into the lake. Dominant tree species at these sites included American elm, common hackberry, silver maple, and black willow.

Site 13 was located in a prairie clearing east of State Park Rd. just north of US-68. Net A was placed along the forest edge within the clearing while Net B was placed in a small wooded corridor separating the clearing from a small pond. The dominant canopy species included American sycamore and winged elm.

Site 14 was located along a wooded trail extending from a private pasture near Riley Hollow Rd. Both nets were placed along the trail. Dominant overstory species included blackgum (*Nyssa sylvatica*), mockernut hickory (*Carya tomentosa*), and bitternut hickory.

A total of 115 bats from seven species was captured at 14 sites (56 net nights) within the proposed roadway reconstruction in Trigg County, Kentucky (Table 3). No federally endangered Indiana bats were captured. The eastern red bat (*Lasiurus borealis*) was the most commonly encountered species, composing 40.0% of the total capture. The tri-colored bat (*Perimyotis subflavus*) bat was the next most frequently captured bat, making up 19.1% of total captures. Other species captured included northern long-eared bats (*Myotis septentrionalis*; 17.4%), the federally endangered gray bat (12.2%), big brown bat (*Eptesicus fuscus*; 6.1%), little brown bat (*Myotis lucifugus*; 4.4%), and an evening bat (*Nycticeius humeralis*; 0.9%). Sites 5 and 10 were found to be the most successful sites with 26 and 21 captures respectively, or 40.9% of all bats. All sites, except site 12, yielded captures during our survey.

During 15 nights (146 total hours) of acoustical sampling, 16,761 noise-filtered files were recorded for an average of 114.8 files per hour (Table 4). There were no noticeable spatial patterns with regards to general site location; however, several individual sites did stand out. Sites 1, 2, 3, 4, 6, and 14 all recorded greater than 10% of the total calls. Indiana bat calls and gray bat calls were identified at nine and 13 sites, respectively (Table 4). Indiana bat identifications were indicated at

a level of 99% probability at four sites while gray bats were recorded at this level at 12 sites (Table 4). These results suggest a strong likelihood that gray bats are present throughout the project area, which was confirmed by mist netting. Additional mist net sampling conducted in an attempt to capture Indiana bats at four sites with high probability of their presence did not yield this species. Therefore, it is unlikely that this species is present in the project area. Indiana bat calls identified by the Automated ID program may represent calls of other species, such as northern long-eared bats, which are similar in call structure.

## 5.0 POTENTIAL EFFECTS

### 5.1 Potential Direct/Indirect Effects – Gray Bat

Gray bats were captured in the project area; therefore, potential effects to this species are discussed below. Mapping of impact areas is located in Figures 4 and 5. No critical habitat has been designated for this species in Kentucky; therefore, no critical habitat will be affected (USFWS 2008).

#### *Direct Effects*

Because gray bats use caves year-round, destruction of karst systems has the potential to directly affect gray bats. Blasting may be used for this project; therefore, there is potential for disruption of bedrock, and there could be direct effects on gray bat maternity or hibernating habitat. However, no suitable caves were reported by KSS or identified during habitat assessments. Therefore, it is unlikely that any portals will be directly affected by road construction.

Gray bats are known to use bridges as roosting locations (Johnson et al. 2002, Keeley and Tuttle 1999) during non-hibernating months. Therefore, demolition of existing bridges during spring/summer/fall could directly impact gray bats.

Construction noise may be a direct effect on gray bats if the bats are harassed to the point of abandoning the potential habitat provided by existing bridges. Various types of equipment will be used for construction, but pile driving of 8-foot diameter steel pipes is the loudest activity that is likely to occur. Illinworth and Rodkin (2007) reported sound measurements from pile-driving of various types and sizes, including steel piles up to 8 feet in diameter. Sound frequency data were not available for 8-foot diameter piles, but for pile sizes between 12 and 72 inches the bulk of the acoustical energy created by pile driving was below 1,000 Hz. For virtually all types of pile driving, most of the acoustic energy was concentrated below 5,000 Hz. No data are available for gray bat hearing capability; however, data are available for little brown bats, which are relatively similar in size and are members of the same genus. Little brown bats are capable of hearing sound between 10,000 hertz (Hz) and 130,000 Hz, with peak hearing sensitivity occurring at approximately 40,000 Hz (Dalland 1965, Grinnell 1963). Therefore, even though pile driving of 8-foot diameter piles can produce sound greater than 200 decibels (Illinworth and Rodkin 2007), bats would not be able to hear the bulk of this sound energy. While pile driving noise is within the audible range for humans (20-20,000 Hz), it is well below the frequency range reported for a *Myotis* species (10,000-130,000 Hz) (Dalland 1965,

Grinnell 1963).

Bats may be able to feel the sound produced by this activity, and other types of equipment may produce sound in other frequency ranges which may be audible to bats; however, if gray bats are roosting in the existing bridges, then it is likely that they are already desensitized to the sounds and vibrations produced by large vehicles such as tractor-trailers and barges coming from directly overhead or below. A number of published examples of bats tolerating vehicular noise exist in the literature. For instance, Brack et al. (2004) found an Indiana bat colony within 50 feet of a four-lane interstate highway (I-64) in Indiana. Similarly, multiple roosts for Indiana bats have been noted within 680 feet of Interstate 81 in New York (Niver 2008). Roost trees are a relatively ephemeral resource, often falling down or losing bark necessary for Indiana bat habitation; therefore, it is likely that at least some of these colonies chose roost trees near interstate highways. Initially, novel sounds or vibrations may startle bats roosting in the existing bridges; however, the studies listed above suggest that bats are able to tolerate noise disturbance.

#### *Indirect Effects*

Construction projects within karst areas have the potential to indirectly affect gray bats through alteration of airflow within cave systems, flooding due to increased runoff, and introduction of contaminants. If blasting is necessary, there is potential for air flow alterations due to changes in the bedrock structure.

Because gray bats forage heavily on aquatic insects, the effect of construction on the aquatic ecosystem is another potential indirect effect of the project. The larvae of many insects develop in the aquatic environment and then metamorphose to live in the adjacent riparian environment where gray bats feed on them. Hopson Creek, Caney Creek, and the backwaters of Kentucky Lake and Lake Barkley are known gray bat foraging habitat, and it is likely that any stream in the project area could be used as foraging habitat by gray bats. Any siltation or pollution that occurs in any of the small streams being crossed by the project has potential to indirectly affect gray bats. Several sections of mapped streams (National Hydrography Dataset) are within the clearing limits and directly adjacent to the project alignment (Figures 4a&b). It is likely that some of these streams will be directly affected by construction activities. Mitigation measures proposed in Section 6.1 will prevent indirect affects to the watershed of these streams.

Before Kentucky Lake was impounded, the natural river flows created relatively steep banks. Dredging the lake bottom is anticipated to be necessary for cutting down these slopes around the proposed bridge piers. This dredging will reduce detrimental seismic effects and achieve the required structural resistance of the bridge structure. It is anticipated that dredging of approximately 100,000 cubic yards of material will be necessary. This has the potential to negatively affect water quality, which might affect the aquatic insects on which gray bats forage; however, the large volume of Kentucky Lake and the use of turbidity control curtains or similar measures will likely render these effects discountable.

**Table 3.** Bat species captured per night during a mist net survey for the federally endangered Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) for the proposed US-68 reconstruction, Trigg and Marshall Counties, KY.

Site	Date	Site leader	<i>Eptesicus fuscus</i>	<i>Lasiurus borealis</i>	<i>Myotis grisescens</i>	<i>Myotis lucifugus</i>	<i>Myotis septentrionalis</i>	<i>Myotis sodalis</i>	<i>Nycticeius humeralis</i>	<i>Perimyotis subflavus</i>	Total
Site 1	7/26/11	Travis Brown	0	1	0	0	0	0	0	1	2
	7/27/11	Travis Brown	0	0	0	0	0	0	0	0	0
Site 2	7/26/11	Scott Slankard	0	1	1	0	0	0	0	2	4
	7/27/11	Scott Slankard	0	2	1	0	1	0	0	4	8
Site 3	7/28/11	Scott Slankard	0	0	0	0	5	0	0	1	6
	7/29/11	Scott Slankard	0	0	0	0	0	0	0	0	0
Site 4	7/29/11	Travis Brown	0	0	1	2	0	0	0	4	7
	7/30/11	Travis Brown	0	1	1	1	1	0	0	1	5
Site 5	7/28/11	Travis Brown	4	5	3	2	1	0	0	0	15
	7/30/11	Scott Slankard	1	7	1	0	1	0	0	1	11
Site 6	8/2/11	Scott Slankard	0	4	0	0	2	0	0	0	6
	8/3/11	Scott Slankard	0	0	0	0	0	0	0	0	0
Site 7	8/8/11	Travis Brown	0	3	0	0	1	0	0	0	4
	8/9/11	Travis Brown	0	3	1	0	3	0	0	0	7
Site 8	8/4/11	Scott Slankard	0	3	0	0	0	0	0	0	3
	8/5/11	Scott Slankard	0	2	0	0	0	0	0	0	2
Site 9	8/4/11	Travis Brown	0	1	0	0	0	0	1	1	3
	8/5/11	Travis Brown	0	0	0	0	0	0	0	2	2
Site 10	8/2/11	Travis Brown	1	7	2	0	3	0	0	4	17
	8/3/11	Travis Brown	1	0	3	0	0	0	0	0	4
Site 11	8/8/11	Dr. Derting	0	0	0	0	0	0	0	0	0
	8/9/11	Dr. Derting	0	0	0	0	1	0	0	1	2
Site 12	8/10/11	Dr. Derting	0	0	0	0	0	0	0	0	0

Biological Assessment  
 KYTC US-68 Reconstruction,  
 Marshall and Trigg Counties, KY

June 2012

Site	Date	Site leader	<i>Eptesicus fuscus</i>	<i>Lasiurus borealis</i>	<i>Myotis grisescens</i>	<i>Myotis lucifugus</i>	<i>Myotis septentrionalis</i>	<i>Myotis sodalis</i>	<i>Nycticeius humeralis</i>	<i>Perimyotis subflavus</i>	Total
	8/11/11	Dr. Derting	0	0	0	0	0	0	0	0	0
Site 13	8/12/11	Travis Brown	0	5	0	0	1	0	0	0	6
	8/13/11	Travis Brown	0	0	0	0	0	0	0	0	0
Site 14	8/10/11	Travis Brown	0	0	0	0	0	0	0	0	0
	8/11/11	Travis Brown	0	1	0	0	0	0	0	0	1
<b>Total</b>			<b>7</b>	<b>46</b>	<b>14</b>	<b>5</b>	<b>20</b>	<b>0</b>	<b>1</b>	<b>22</b>	<b>115</b>
Frequency			0.06	0.40	0.12	0.04	0.17	0.00	0.01	0.19	1.00

**Table 4.** Bat passes and Indiana bat (*Myotis sodalis*) and gray bat (*M. grisescens*) presence probabilities recorded each night at each acoustic monitoring station for the proposed US-68 reconstruction, Trigg and Marshall Counties, KY

Site	Date	Recording Duration	Total Noise filtered Calls	Hourly Average	<i>Myotis sodalis</i> Detection Probability <sup>1</sup>	<i>Myotis grisescens</i> Detection Probability <sup>1</sup>
Site 1	2011-Jul-26	5	394	78.8	0	0
	2011-Jul-27	5	1315	263.0	0	3
Site 2	2011-Jul-26	5	1827	365.4	1	3
	2011-Jul-27	5	843	168.6	0	0
Site 3	2011-Jul-28	5	1162	232.4	3	3
	2011-Jul-29	5	679	135.8	3	3
Site 4	2011-Jul-29	8	1268	158.5	3	3
	2011-Jul-30	5	427	85.4	0	3
Site 5	2011-Jul-28	5	201	40.2	0	3
	2011-Jul-30	5	342	68.4	0	3
Site 6	2011-Aug-02	5	1631	326.2	3	3
	2011-Aug-03	5	843	168.6	1	3
Site 7	2011-Aug-08	5	191	38.2	0	3
	2011-Aug-09	5	189	37.8	2	3
Site 8	2011-Aug-04	5	64	12.8	1	2
	2011-Aug-05	5	214	42.8	0	2
Site 9	2011-Aug-04	5	252	50.4	3	2
	2011-Aug-05	5	327	65.4	0	3
Site 10	2011-Aug-03	8	994	124.3	1	3
	2011-Aug-03	5	467	93.4	1	3
Site 11	2011-Aug-08	5	65	13.0	0	3
	2011-Aug-09	5	51	10.2	0	2
Site 12	2011-Aug-10	5	149	29.8	0	3
	2011-Aug-11	5	748	149.6	0	3
Site 13	2011-Aug-12	5	108	21.6	0	3
	2011-Aug-13	5	181	36.2	0	0
Site 14	2011-Aug-10	5	980	196.0	2	0
	2011-Aug-11	5	849	169.8	0	0

<sup>1</sup>Detection Probability: 3 = 99%; 2 = 95%; 1 = 90%; 0 = < 90%

## 5.2 Potential Direct/Indirect Effects – Indiana Bat

No Indiana bats were captured during the course of surveys for this project; therefore, they are likely absent from the project area. A discussion of potential effects is provided below; however, it is unlikely that these effects will occur due to the apparent absence of Indiana bats from the project area.

### *Direct Effects*

Critical habitat for Indiana bats consists of large hibernacula, which are of primary concern for Indiana bat conservation, especially due to the recent discovery of white-nose syndrome in several counties in Kentucky, including Trigg County (USFWS 2012). The closest critical habitat is Coach Cave in Edmonson County, Kentucky (Federal Register, 41 FR 41914); however, this habitat is more than 90 miles from the project area. Therefore, no effects to critical habitat are anticipated.

Trees of suitable roost tree diameter (>12.7 cm) with cavities, broken branches, and sloughing bark are present within the clearing limits. Removal during summer could risk the take of multiple individuals and their pups; therefore, summer clearing is a potential direct effect of construction and winter clearing would be a potential indirect effect. The USFWS has provided georeferenced buffers of known Indiana bat occurrences in Kentucky (USFWS 2011a). No portion of the clearing limits is overlapped by known Indiana bat maternity or swarming habitat (Figures 2 & 3). Therefore, removal of trees in this area has the potential to directly impact Indiana bat habitat, but this is unlikely because none have been identified from within the clearing limits.

Eco-Tech identified 141.13 acres of forested habitat within the clearing limits that could potentially be used by Indiana bats for foraging and/or roosting habitat (Figures 4 and 5). All of this acreage falls within seven miles of known priority 3 or 4 swarming habitat.

Construction during the hibernating season that results in destruction of karst systems has the potential to directly affect Indiana bats. No karst features suitable as Indiana bat winter habitat were identified. Blasting may be used for this project, but in the absence of identified potential hibernacula it is unlikely to directly affect Indiana bats.

Indiana bats have been known to use bridges as roosting locations (Keeley and Tuttle 1999) during non-hibernating months. Therefore, demolition of existing bridges during spring/summer/fall could directly impact Indiana bats.

Construction noise may be a direct effect on Indiana bats if the bats are harassed to the point of abandoning the potential habitat provided by existing bridges or nearby trees. Various types of equipment will be used for construction, but pile driving of 8-foot diameter steel pipes is the loudest activity that is likely to occur. Illinworth and Rodkin (2007) reported sound measurements from pile-driving of various types and sizes, including steel piles up to 8 feet in diameter. Sound frequency data were not available for 8-foot diameter piles, but for various pile sizes between 12 and 72 inches the bulk of the acoustical energy created by pile driving

was below 1,000 Hz. For virtually all types of pile driving, most of the acoustic energy was concentrated below 5,000 Hz. No data are available for Indiana bat hearing capability; however, data are available for little brown bats, which are relatively similar in size and are members of the same genus. Little brown bats are capable of hearing sound between 10,000 hertz (Hz) and 130,000 Hz, with peak hearing sensitivity occurring at approximately 40,000 Hz (Dalland 1965, Grinnell 1963). Therefore, even though pile driving of 8-foot diameter piles can produce sound greater than 200 decibels (Illinworth and Rodkin 2007), bats would not be able to hear the bulk of this sound energy. While pile driving noise is within the audible range for humans (20-20,000 Hz), it is well below the frequency range reported for a *Myotis* species (10,000-130,000 Hz) (Dalland 1965, Grinnell 1963).

Bats may be able to feel the sound produced by this activity, and other types of equipment may produce sound in other frequency ranges which may be audible to bats; however, if bats are roosting in the existing bridges, then they are already desensitized to the sounds and vibrations produced by large vehicles such as tractor-trailors and barges coming from directly overhead or below. Initially, novel sounds or vibrations may startle bats roosting in trees or bridges near the proposed alignment; however, bats are able to adapt to vehicular disturbances. Gardner et al. (1991) stated that noise and exhaust emissions from machinery may possibly disturb colonies of roosting bats, but suggested that disturbances would have to be severe to cause roost abandonment. A number of published examples of bats adapting to vehicular noise exist in the literature. For instance, Brack et al. (2004) found an Indiana bat colony within 50 feet of a four-lane interstate highway (I-64) in Indiana. Similarly, multiple roosts for Indiana bats have been noted within 680 feet of Interstate 81 in New York (Niver 2008).

#### *Indirect Effects*

Construction projects within karst areas have the potential to indirectly affect Indiana bats through alteration of airflow within cave systems, flooding due to increased runoff, and introduction of contaminants. If blasting is conducted, there is potential for air flow alterations due to changes in the bedrock structure. There are thirty-four known sinkholes located within one kilometer of the centerline. The nearest sinkhole to the clearing limits is approximately 30 meters and two additional sinkholes fall within 150 meters. Because of increases in paved area, the project has the potential to increase the speed with which water drains into sinkholes, and may increase flooding of the receiving karst systems. Moreover, two springs fall within the clearing limits, but it is unlikely that alterations to the springs will result in effects on bat habitat due to their small size and lack of suitable external openings. In addition, soil disturbance may increase the silt load of runoff within the project area if sediment and erosion Best Management Practices (BMPs) are not in place. Mitigation measures are proposed in Section 6.1 which will reduce the potential negative effects of runoff.

Another potential indirect effect of the project is disturbance to the aquatic ecosystem. Indiana bats forage extensively on insects, and many insects have aquatic larvae. Mitigation of impacts to the aquatic ecosystem is discussed in Section 6.1.

### 5.3 Potential Cumulative Effects

Potential cumulative effects associated with the proposed project are shared by both species covered in this biological assessment. In addition to the direct and indirect disturbance associated with construction, there will be cumulative disturbance over time created by maintenance and use of the US 68 alignment. Noise disturbance and chemical contamination may be associated with maintenance activities, which may include, but are not limited to mowing, pavement repairs, ditch maintenance, and management of woody species. While there is a permanent cumulative effect of road disturbance both Indiana and gray bats are capable of adapting to the presence of large roadways, and roosts for each species have been found in close proximity to roads (Brack et al. 2004, Johnson et al. 2002, Keeley and Tuttle 1999). It is unlikely that the proposed reconstruction will lead to additional development in the area as there is currently a road in this location, the road is located in a rural area, and much of the land is preserved as a National Recreation Area where development is not allowed.

## 6.0 MITIGATION OF IMPACTS TO THREATENED/ENDANGERED SPECIES

### 6.1 Gray Bat

In order to minimize or nullify the potential *Myotis grisescens* impacts mentioned above, the Kentucky Transportation Cabinet documents herein, several efforts designed to minimize and mitigate.

The Kentucky Transportation Cabinet Design Executive Summary (Lanham 2005) contained within the Preliminary Drainage Design Advance Folder (Palmer Engineering Company 2010) shows the following regarding minimization and mitigation issues related to the water resources, which would also be of value for negating impacts to potential foraging areas by *M. grisescens*:

### AVOIDANCE ALTERNATIVES FOR WATER RELATED IMPACTS

The proposed roadway crosses the Kentucky Lake, Lake Barkley, and a number of small streams. Avoidance of these crossings is not possible, as the main objective of the project is to replace the existing, structurally deficient bridges and restructure the alignment. The bridge spans will be arranged so as to keep the main channels open and unobstructed to flow. The abutments may be skewed slightly to the flow direction, but perpendicular to the roadway, to mimic the current footprint of the existing bridge. The use of rip rap will be limited to the channel banks, and used only in the immediate vicinity of the structure. All in-lake construction will contain Erosion Prevention and Sedimentation Control (EPSC) measures to include but not be limited to:

All water leaving the construction site via ditch or sheet flow will be controlled by sediment traps or silt fence to limit sediment that might reach the streams. Erosion control plans will be developed and included with the plan set. These plans will be updated by the contractor as construction proceeds. All erosion and sediment devices will be sized to properly prevent or

retain sediment from leaving the project site.

Additional mitigation and minimization procedures will be:

- 1) In areas not treated with rip-rap or otherwise stabilized, re-vegetation of stream bank and riparian zones shall occur concurrently with the project progression. Species of grasses, shrubs, and trees that are indigenous to the area or those recommended by the Division of Environmental Analysis biologist for District 1, Commonwealth of Kentucky Transportation Cabinet, should be planted.
- 2) To the maximum extent practicable, all work shall be performed during low flow conditions.
- 3) The fill created by discharge and/or deposition of any dredged or excavated materials onshore, and all earthwork operations, shall be carried out in such a way that sediment runoff and soil erosion to the watercourse are controlled and minimized. Best management practices for water pollution control shall be incorporated into project design plans according to Section 213.03.01 of the Kentucky Standard Specifications for Road and Bridge construction, current edition.
- 4) Heavy equipment (bulldozers, cranes, backhoes, drag lines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances where such in-stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to substrates and bank or riparian vegetation.
- 5) Spoil materials from the watercourse of on-shore operations, including sludge deposits, shall not be dumped into watercourses as specified under Section 404 guidelines of the Clean Water Act. During the dredging of approximately 100,000 cubic yards of material from the Kentucky Lake bottom, a turbidity curtain or similar measure will be used to reduce siltation. Area for deposit of dredged materials shall be provided with temporary dikes or bulkheads for separation and retention of settleable solids. Dredge spoil will be deposited in a location that is to be approved by the Tennessee Valley Authority, U.S. Army Corps of Engineers, and Kentucky Division of Water prior to deposition.
- 6) Measures shall be taken to prevent or control spills of fuels, lubricants, or any other materials used in construction from entering the watercourse.
- 7) Any fill or rip-rap shall be of such composition that it will NOT adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violation Volume 1 of 1 Page 11 of 119 of water quality standards. If rip-rap is utilized, it is to be of such size and weight that bank stress or slump conditions will not be created because of its placement, as specified in Section 703 of the Kentucky Standard Specifications for Road and Bridge construction, current edition.

Additionally, the Kentucky Transportation Cabinet agrees to adhere to the following measures specifically aimed at the use of habitat by bats:

- \* Seasonal restrictions placed upon the deconstruction of the old bridges once the new bridges are operational. KTC will deconstruct the existing bridge during the period of time when bats and osprey are not present (November 15-March 15).
- \* Construction activities (excluding bridge deck pouring) will occur only during daylight hours in and near the stream during the season of potential occupation by bats (April 1 - November 14). Because of increased heat and humidity experienced during the summer months, deck pouring may need to occur during times when *M. grisescens* actively forage. Pouring of concrete during night-time hours allows for proper curing to increase structural integrity and long-term sustainability of the bridge deck. The Kentucky Transportation Cabinet feels that deck-pouring activities occurring at night will not alter the behavioral patterns of *M. grisescens* potentially foraging over the large lakes and stream networks during these periods.
- \* To reduce erosion and sedimentation effects of highway construction projects, the Kentucky Transportation Cabinet is bound by the tenets of KPDES permit No. KYR10 for all construction projects involving soil disturbance. For the subject project, a site specific Erosion Control Plan (ECP), has been developed in order to outline potential water quality issues by determining individual Disturbed Drainage Areas (DDA) where construction site effluent will be discharged off-site or into Waters of the Commonwealth (see Appendix C). Within the ECP, sediment control structures have been marked at each DDA discharge point. These structures are suggestions based on engineering practices developed by the Design Engineer.
- \* According to Section 213.03.01 of the Kentucky Transportation Cabinet Standard Specifications, a BMP Plan (in accordance with KPDES permit No. KYR10) will be developed jointly by the Resident Engineer and the contractor prior to the Preconstruction Conference. The BMP Plan will be developed utilizing information contained within the ECP. Through progression of the project, the BMP Plan will be updated in order to address the ever-changing on-site conditions to assure the overall goal of erosion control and sediment containment. The BMP Plan shall be modified when there is a change in design, construction, operation or maintenance of the site which has a significant effect on the potential for the discharge of pollutants to waters of the Commonwealth. The BMP shall also be amended if any aspect (during inspections conducted by the Resident Engineer and contractor simultaneously every 7 days or after rain events greater than 0.5") is determined to be ineffective in controlling the discharge of pollutants to waters of the Commonwealth. Any changes in the BMP Plan shall be implemented within 7 days of the monitoring or action event. Appropriate documentation of changes in the BMP Plan will be maintained throughout the duration of the project. Further, Appropriate documentation (pictures, monitoring log, etc.) of inspections will be maintained on the construction site.
- \* It is expected that impacts to the riparian corridor will be negligible-to-nonexistent as the vast majority work will be performed on the existing roadbed. Prior to any disturbance of

the riparian corridor, the Resident Engineer and contractor will meet at the project site to determine which vegetation (if any) will be removed in order to minimize riparian disturbance. All areas will be replanted with native species as necessary. Planting lists will be developed for construction personnel by the DEC and D1 biologist.

- \* A premium will be placed on keeping debris attributed to Phase I and II Removal out of the water. Debris that does enter the stream will be removed immediately. Due to on-site restraints, equipment will be used on the barges, banks, and if necessary via a pad at the edge of the water.
- \* Pouring of concrete for piers and/or decking will be done such that spills into the stream do not occur. In the unforeseen event that spillage does occur, the Frankfort USFWS office will be notified and the resident engineer shall halt the activity immediately and not resume until appropriate remedial actions have been implemented.
- \* Equipment cleaning/staging areas will be located such that runoff from these areas will not directly enter the water. Filtration of effluent from equipment cleaning/staging areas will be located such that effluent will be filtered through vegetated areas and/or proper sediment control structures located between the staging area and the water; therefore, minimizing the potential for impacts such as sedimentation and pollution.
- \* The proposed bridges have been designed to reduce impacts to the water by creating a single-span, spread box beam bridge over the lakes. Two of the existing piers will be removed.
- \* During footer/pier construction, coffer dams, sediment curtains, and/or sandbags and pumps may be utilized in order to be able to pour the footers. If so, water removed from inside the coffer dams or sandbagged areas will be filtered using an approved sediment filtration method prior to release into the water.
- \* USFWS and the D1 biologist shall be contacted by the KYTC District 1 Environmental Coordinator at least one week prior to the start of construction for the proposed project.

## **6.2 Indiana Bat**

No Indiana bats were located during surveys; therefore, no mitigation measures specific to Indiana bats are proposed. However, mitigation measures, such as seasonal tree clearing restrictions in riparian areas and sediment and erosion control measures may also benefit Indiana bats if they are present.

## **7.0 CONCLUSIONS**

The presence of gray bats and Indiana bats is known within close proximity to the project area. Gray bats were captured during mist net surveys as part of this biological assessment, but no Indiana bats were captured.

No caves capable of sustaining bats will be directly impacted. Potential direct effects caused by demolition of the existing bridges and indirect effects will be mitigated through measures proposed in Section 6.1. Therefore, we conclude that, as long as minimization and mitigation measures are implemented this project is not likely to adversely affect the gray bat (Table 5).

There is no known summer or winter habitat for Indiana bats within 1km of the clearing limits. There is potential summer habitat for Indiana bats within the clearing limits, but no Indiana bats were captured in 14 sites (28 nights) of sampling. Given the above information, we conclude that the project is not likely to adversely affect Indiana bats.

Table 5. Determination of potential effects to federally listed species as a result of the US 68 Reconstruction Project.

Common Name	Scientific Name	Effect Determination
gray bat	<i>Myotis grisescens</i>	May Affect, Not Likely to Adversely Affect
Indiana bat	<i>Myotis sodalis</i>	May Affect, Not Likely to Adversely Affect

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DRAFT

**MEMORANDUM OF AGREEMENT  
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION  
PURSUANT TO 36 CFR Part 800.6(a)**

**WHEREAS**, the Federal Highway Administration (FHWA) has determined that replacement of the Eggner's Ferry Bridge (US 68-80) over Kentucky Lake and the Lawrence Memorial Bridge (US 68-80) over Lake Barkley in Marshall and Trigg Counties, Kentucky, will have an effect on the Eggner's Ferry Bridge (US 68-80) over Kentucky Lake and the Lawrence Memorial Bridge (US 68-80) over Lake Barkley, properties eligible for inclusion in the National Register of Historic Places; and

**WHEREAS**, the FHWA has consulted with the Kentucky State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act, as amended, (16 U.S.C. 470f); and

**WHEREAS**, the Kentucky Transportation Cabinet (KTC) participated in the consultation and has been invited to concur in this Memorandum of Agreement; and

**NOW, THEREFORE**, the FHWA and Kentucky SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

**Stipulations**

FHWA will ensure that the following measures are carried out:

**I. In situ Preservation or Relocation**

FHWA and the Kentucky SHPO agree that the Eggner's Ferry Bridge and the Lawrence Memorial Bridge cannot be moved or relocated due to their size and structural characteristics; therefore, the following measures will be carried out.

**II. Recordation**

**A.** Prior to demolition of the Eggner's Ferry Bridge and/or the Lawrence Memorial Bridge, the following procedures shall be carried out by the KTC:

1. The SHPO will be consulted.
2. The KTC and SHPO will consider the possibility of incorporating significant architectural elements of the old bridges into the new bridges.

*Handwritten signatures and initials:*  
AM Dem  
RCSB  
LWT

3. The bridges will be documented by a qualified, professional architect, historian, or architectural historian in order to have a record of their history and appearance. Documentation will include:
  - a. Compiling archival documents such as original construction plans and other field plans or records maintained by the Kentucky Transportation Cabinet. A brief report describing the history and architectural significance of each bridge will be prepared;
  - b. Completion of a Kentucky Intensive Historic Resource Inventory form for each bridge;
  - c. Black and white 35mm photographs showing the bridges and their surrounding environmental setting, views from each approach, close up photographs of significant historic, structural, and engineering details. Photographs should be printed on 5" x 7" archival quality, acid free paper. Negatives should be placed in acid free sleeves, accompanied by a list describing each frame. In addition, the bridges will be documented with a series of 35mm color slides.
  - d. Two copies of this documentation will be prepared by the KTC. One copy will be submitted to the SHPO for review and approval. Upon acceptance of the documentation by the SHPO, the KTC will provide the second copy to a local organization or archive designated by the SHPO.

### **III. Archaeological Investigations**

- A. Provision will be made for the protection and/or recovery of any archaeological data that might be affected by the Eggner's Ferry Bridge/Lawrence Memorial Bridge replacements, in a manner that takes into account the ACHP's handbook, "Treatment of Archaeological Properties" and that is acceptable to the SHPO. If consultation with the SHPO determines there is a potential for archaeological remains within the project impact areas:
  1. The KTC will conduct Phase I and/or Phase II archaeological investigations of the project areas and submit a report of the findings to the SHPO for review and approval.
  2. If the investigations find archaeological sites or remains that, in the opinion of the SHPO, are eligible for listing in the National Register of Historic Places, these will be avoided and preserved in place, wherever possible.
  3. Where avoidance is not possible, or if in the opinion of the SHPO there would be adverse impacts to eligible archaeological sites, the KTC will, in consultation with the SHPO, develop a research design and data recovery plan in conformance with the Secretary of the Interior's Standards for Archaeology and Historic Preservation

Projects. The research design and data recovery plan will be submitted to the SHPO for review and approval. Unless the SHPO comments or objects within thirty (30) days of receiving the research design and data recovery plan, the KTC shall ensure that the plan is implemented.

4. Within ninety (90) days of completion of the mitigation, a report on the data recovery will be submitted to the SHPO for review, comment, and approval. The KTC shall ensure that the report is prepared in accordance with the SHPO's most current Specifications for Archaeological Field Work and Assessment Reports and the Secretary of the Interior's Standards for Archaeology and Historic Preservation Projects.
5. The KTC shall ensure that all materials and records resulting from the archaeological data recovery are curated in Kentucky in accordance with 36 CFR Part 79 at an institution acceptable to the SHPO.

#### **IV. Professional Qualifications**

- A. The KTC shall ensure that all historic preservation work carried out pursuant to this agreement is carried out by or under the direct supervision of a person meeting the professional qualifications set forth in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation. (48 FR 44716-42). The KTC shall submit a vita of this individual to the SHPO for review and approval.

#### **V. Resolution of Disagreements**

- A. Should the SHPO object within 30 days to any plans, specifications, reports or other actions submitted or undertaken pursuant to this Memorandum of Agreement, the FHWA and KTC shall consult with the SHPO to resolve the objection. If the FHWA and KTC determine that the objection cannot be resolved, the FHWA shall request the further comments of the Council pursuant to 36 CFR 800.6(b). Any Council comment provided in response to such a request will be taken into account by the FHWA in accordance with 36 CFR 800.6(c)(2) with reference only to the subject of the dispute; the FHWA's responsibility to carry out all actions under this Memorandum of Agreement that are not the subjects of the dispute will remain unchanged.

Execution of this Memorandum of Agreement and implementation of its terms evidence that FHWA has afforded the Council an opportunity to comment on the Eggnor's Ferry Bridge and the Lawrence Memorial Bridge (US 68-80) replacement projects and their effects on historic properties, and that FHWA has taken into account the effects of the undertaking on historic properties.

**FEDERAL HIGHWAY ADMINISTRATION, U.S. DEPARTMENT OF TRANSPORTATION**

BY: *S. Silvia Michael* 5/10/96  
Kentucky Division Administrator Date

**KENTUCKY HERITAGE COUNCIL**

BY: *Paul Meyer* 4-23-96  
State Historic Preservation Officer Date

**CONCURRING PARTIES**

**KENTUCKY TRANSPORTATION CABINET**

BY: *Don Lambert* 4/9/96  
State Highway Engineer Date

**ACCEPTED for the Advisory Council on Historic Preservation**

BY: *Robert D. Bush* Date: 7/3/96  
Robert D. Bush, Executive Director

**MEMORANDUM OF AGREEMENT  
PURSUANT TO 36 CFR § 800.6  
FOR PHASE I ARCHAEOLOGICAL SURVEY OF  
PARCELS 502, 504, 505, and 514  
TRIGG COUNTY, KENTUCKY. ITEM NUMBER: I-180.00**

**Responsible Parties:**

FHWA - Kentucky Division  
John C. Watts Federal Building  
330 W. Broadway  
Frankfort, KY 40601

Kentucky State Historic Preservation Office  
300 Washington Street  
Frankfort, Kentucky 40601

**Concurring Party:**

Kentucky Transportation Cabinet  
200 Mero Street  
Frankfort, Kentucky 40622

**UNDERTAKING:** US68/80 Realignment, Trigg County, Item #1-180.00

**STATE:** Kentucky

**AGENCY:** Federal Highway Administration

**WHEREAS**, the Federal Highway Administration (FHWA), as a federal agency, is responsible for assuring compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470) and pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

**WHEREAS**, the Kentucky Heritage Council (Kentucky SHPO) is responsible for the protection of historic resources within the Commonwealth; and

**WHEREAS**, the Kentucky Transportation Cabinet (KYTC), in the interest of providing a safe, efficient and environmentally sensitive transportation system for the Commonwealth, has proposed the Project, which will utilize funding from FHWA; and

**WHEREAS**, the consulting parties agree that Indian Tribes that may attach religious or cultural importance to the affected properties have been consulted and have raised no objection to the work proposed; and

**WHEREAS**, KYTC has made a good faith effort to archaeologically survey all parcels to be affected by the project; and,

**WHEREAS**, KYTC has been unable to conduct investigations on four parcels due to landowner unavailability or denial of access; and,

**WHEREAS**, KYTC is confident, based upon surveys in the area completed to date, geographic features, etc., that the unsurveyed parcels do not include archaeological features of such significance that would warrant preservation-in-place; and,

**WHEREAS**, to the best of our knowledge and beliefs, no human remains, associated or unassociated funerary objects, sacred objects, or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001), are expected to be encountered during subsequent investigations;

**NOW, THEREFORE**, FHWA, Kentucky SHPO, and KYTC agree that the un-surveyed parcels (502, 504, 505, and 514) of the proposed project area will be surveyed in accordance with the following stipulations:

#### STIPULATIONS

The FHWA shall ensure that the following measures are carried out:

1. Appropriate levels of archaeological investigation will be conducted prior to the initiation of any construction activities. A Management Summary shall be submitted to KYTC and KHC within 30 days of completion of fieldwork. A draft report prepared in accordance with the SHPO's Specifications for Archaeological Field Work and Assessment Reports will be submitted by the Archaeologist to the Kentucky SHPO and KYTC for review and comment within 180 days of completion of fieldwork. The final report, which will incorporate the Kentucky SHPO's and the KYTC's comments, if any, will be submitted within 60 days of receipt of these comments.
2. If archaeological sites are identified that are considered potentially eligible by the SHPO for listing in the National Register of Historic Places, they will be further tested to determine their eligibility.. Upon completion of the testing, a report will be prepared in accordance with the SHPO's most current Specifications for Archaeological Field Work and Assessment Reports and will be submitted by FHWA to the SHPO and interested Indian Tribes for review and comment.
3. An appropriate level of investigation will be conducted prior to the initiation of any construction activities in the area of the reported cemetery on Parcel 513, Station 106+450, in accordance with 600 KAR 3:020 (Grave Relocation) and Chapter 11 of the Kentucky Transportation Cabinet Right-of-Way Manual (Relocation of Human Remains.) Consultation among FHWA, KHC and KYTC will determine the best course of action if a cemetery is located.

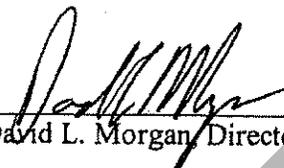
4. If based on the testing, a site is determined by the SHPO to be eligible for listing in the National Register, FHWA will develop a data recovery plan in conformance with the Secretary of the Interior's Standards for Archaeology and Historic Preservation (48 FR 44716-42). The data recovery plan will be submitted to the SHPO for review and comment. Unless the SHPO comments or objects within thirty (30) days of receiving the data recovery plan, FHWA shall ensure that the plan is implemented.
5. All archaeological investigations required pursuant to this agreement will be carried out under the direct supervision in the field of an archaeological Principal Investigator (Archaeologist) who meets or exceeds the qualifications for professionalism set forth in the Secretary of the Interior's Standards for Archaeology and Historic Preservation Projects (48 FR 44738-9). The KYTC will submit a vita for this individual as well as other key staff including archaeological Field Directors to the Kentucky SHPO for review and concurrence that they meet the Secretary's Standards, have adequate experience in the excavation of similar sites in Kentucky, and are qualified to carry out the proposed work.
6. Those portions of archaeological site 15TR1 that contain intact deposits have been avoided by the proposed project. If during the right of way acquisition phase, it is determined that additional property from parcel 402 is to be purchased (uneconomic remnant, etc.), beyond that identified in current plans as necessary for the construction of the project, FHWA shall consult with the KHC regarding proposed long-term use of the property, the potential affects on the archeological site, and the ultimate disposition of the parcel. The objective of the consultation will be to either establish a means for permanent protection of the site or portions of the site affected, or to excavate the site, exhausting its potential to yield further significant data.
7. All artifacts recovered during the course of the investigations as well as all notes, field records, photographs, and other records will be permanently curated at the University of Kentucky.
8. This Memorandum of Agreement may be amended or modified at any time through the mutual consent of the signatories. If amended or modified, a revised copy will be provided to all the signatories and to the Advisory Council.
9. Disputes regarding the completion of the terms of this agreement shall be resolved by the signatories. If the signatories cannot agree regarding a dispute, any one of the signatories may request the participation of the Advisory Council on Historic Preservation to assist in resolving the dispute.
10. This agreement shall be null and void if its terms are not carried out within five (5) years from the date of its execution, unless the signatories agree in writing to an extension for carrying out its terms. If terminated prior to completion of all of its terms, the KYTC and FHWA will comply with 36 CFR 800.6(b)(1)(iv).

**MEMORANDUM OF AGREEMENT  
PURSUANT TO 36 CFR § 800.6  
FOR PHASE I ARCHAEOLOGICAL SURVEY OF  
PARCELS 502, 504, 505, and 514  
REPORTED CEMETERY ON PARCEL 513  
TRIGG COUNTY, KENTUCKY. ITEM NUMBER: 1-180.00**

**FEDERAL HIGHWAY ADMINISTRATION, KENTUCKY DIVISION**

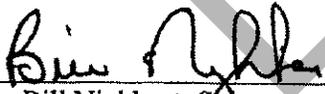
BY:  Date: 9/16/06  
for Jose Sepulveda, Division Administrator

**KENTUCKY STATE HISTORIC PRESERVATION OFFICER**

BY:  Date: 9-14-06  
David L. Morgan, Director, Kentucky Heritage Council

**Concurring Party**

**KENTUCKY TRANSPORTATION CABINET**

BY:  Date: 08/23/06  
Bill Nighbert, Secretary

**APPROVED AS TO FORM AND LEGALITY:**

 Date: 9/16/06  
Office of General Counsel



STEVEN L. BESHEAR  
GOVERNOR

LEONARD K. PETERS  
SECRETARY

**ENERGY AND ENVIRONMENT CABINET**  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WATER  
200 FAIR OAKS LANE, 4TH FLOOR  
FRANKFORT, KENTUCKY 40601  
[www.kentucky.gov](http://www.kentucky.gov)

September 5, 2014

David Waldner, Director  
Kentucky Transportation Cabinet  
200 Mero Street, 5<sup>th</sup> Floor  
Frankfort, KY 40622

Re: Water Quality Certification #WQC 2014-051-1  
US 68/KY80 Over Lake Barkley - Trigg Co  
KYTC Item No. 1-180.60  
AI No.: 6816  
Activity ID: APE20140001  
Trigg County, Kentucky

Dear Mr. Waldner:

Pursuant to Section 401 of the Clean Water Act (CWA), the Commonwealth of Kentucky certifies it has reasonable assurances that applicable water quality standards under Kentucky Administrative Regulations Title 401, Chapter 10, established pursuant to Sections 301, 302, 303, 304, 306, and 307 of the CWA, will not be violated by the above referenced project provided that the U.S. Army Corps of Engineers authorizes the activity under 33 CFR part 330, and the attached conditions are met.

All future correspondence on this project must reference **AI No. 6816**. **The attached document is your official Water Quality Certification; please read it carefully.** If you should have any questions concerning the conditions of this water quality certification, please contact James Bicknell of my staff by calling (502) 564-3410.

Sincerely,

**Adam Jackson, Supervisor**  
Water Quality Certification Section  
Kentucky Division of Water

AJ:JB

Attachment

cc: Amy Robison, USACE: Nashville District  
Roy Collins, KYTC DEA

# KTC Water Quality Certification

US 68 - Trigg Co  
Facility Requirements  
Permit Number: WQC 2014-051-1  
Activity ID No.: APE20140001

## ACTV0000000005 (KYTC 1-180.60) Lake Barkley Bridge:

### Submittal/Action Requirements:

Condition No.	Condition
S-1	The Kentucky Transportation Cabinet (KYTC) must notify the Division: Due prior to any construction activity. Notify the Water Quality Certification (WQC) Section of the Kentucky Division of Water (KDOW) at (502) 564-3410 at least two weeks prior to construction. [Clean Water Act]
S-2	The KYTC must notify the Division: Due when construction is complete. Notify the WQC Section of the KDOW at (502) 564-3410 no later than two weeks post construction. [Clean Water Act]

### Narrative Requirements:

Condition No.	Condition
T-1	The work approved by this certification shall be limited to: <ul style="list-style-type: none"><li>- the loss of 750 linear feet of ephemeral stream channel due to bridge construction</li><li>- the loss of 0.97 acres of open waterbody due to the construction of the Causeway</li><li>- the loss of 0.33 acres of open waterbody due to the construction of the Bridge Piers (approach spans and main span). [Clean Water Act]</li></ul>
T-2	All work performed under this certification shall adhere to the design and specifications set forth in the application package titled " US 68/KY80 Over Lake Barkley 1-180.60" received by KDOW on April 4th, 2014. [Clean Water Act]
T-3	The KYTC is responsible for preventing degradation of waters of the Commonwealth from soil erosion. An erosion and sedimentation control plan must be designed, implemented, and maintained in effective operating condition at all times during construction. [Clean Water Act]
T-4	The Division of Water reserves the right to modify or revoke this certification should it be determined that the activity is in noncompliance with any condition set forth in this certification. [Clean Water Act]
T-5	If construction does not commence within two years of the date of this letter, this certification will become void. A letter requesting a renewal should be submitted. [Clean Water Act]

# KTC Water Quality Certification

US 68 - Trigg Co

Facility Requirements

Permit Number: WQC 2014-051-1

Activity ID No.: APE20140001

## ACTV0000000005 (continued):

### Narrative Requirements:

Condition No.	Condition
T-6	Other permits from the Division of Water may be required for this activity. If this activity occurs within a floodplain, a Permit to Construct Across or Along a Stream may be required. Please contact Todd Powers (502-564-3410) for more information. If the project will disturb one acre or more of land, or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land, a Kentucky Pollution Discharge Elimination System (KPDES) stormwater permit shall be required from the Surface Water Permits Branch. This permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must include erosion prevention and sediment control measures. Contact: Surface Water Permits Branch (SWPB) Support (502-564-3410 or SWPBsupport@ky.gov). [Clean Water Act]
T-7	Dredging work shall not be conducted during the fish spawning season, April 15th through June 15th. [Clean Water Act]
T-8	Mitigation for impacts shall begin prior to or concurrently with impacts. [Clean Water Act]
T-9	Check dams are not allowed within the stream channel. [Clean Water Act]
T-10	Remove all sediment and erosion control measures after re-vegetation has become well-established. [Clean Water Act]



STEPHEN L.  
BESHEAR  
GOVERNOR

**ENERGY AND ENVIRONMENT CABINET**  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WATER  
200 FAIR OAKS LANE  
FRANKFORT, KENTUCKY 40601  
www.kentucky.gov

LEONARD K. PETERS  
SECRETARY

## ATTENTION APPLICANT

If your project involves one or more of the following activities, you may need more than one permit from the Kentucky Division of Water.

- \*building in a floodplain      \*road culvert in a stream
- \*streambank stabilization      \*stream cleanout
- \*utility line crossing a stream
- \*construction sites an acre or more

- If the project will disturb one acre or more of land, or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land, a Kentucky Pollution Discharge Elimination System (KPDES) stormwater permit shall be required from the Operational Permits Section. This permit requires the creation of an erosion control plan.

Contact Allen Ingram.

- Projects that involve filling in the floodplain will require a stream construction permit from the Floodplain Management Section.

Contact Todd Powers.

- Projects that involve work IN a stream, such as bank stabilization, road culverts, utility line crossings, and stream alteration will require a stream construction permit and a Water Quality Certification from the Water Quality Certification Section.

Contact Barbara Scott.

All three contacts listed above can be reached at 502/564-3410. A complete listing of environmental programs administered by the Kentucky Department for Environmental Protection is available from Pete Goodman by calling 502/564-3410.

## **GENERAL CONDITIONS FOR WATER QUALITY CERTIFICATION**

1. The Kentucky Division of Water may require submission of a formal application for an Individual Certification for any project if the project has been determined to likely have a significant adverse effect upon water quality or degrade the waters of the Commonwealth so that existing uses of the water body or downstream waters are precluded.
2. Nationwide permits issued by the U.S. Army Corps of Engineers for projects in Outstanding State Resource Waters, Cold Water Aquatic Habitats, and Exceptional Waters as defined by 401 KAR 10:026 shall require individual water quality certifications.
3. Erosion and sedimentation pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur.
4. Sediment and erosion control measures (e.g., check-dams, silt fencing, or hay bales) shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, placement shall not be conducted in such a manner that may cause instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control measures shall be removed and the natural grade restored prior to withdrawal from the site.
5. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse.
6. To the maximum extent practicable, all in-stream work under this certification shall be performed during low flow.
7. Heavy equipment (e.g. bulldozers, backhoes, draglines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances where such in-stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation.
8. If there are water supply intakes located downstream that may be affected by increased turbidity, the permittee shall notify the operator when work will be performed.
9. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.
10. Should stream pollution, wetland impairment, and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/564-2380.