

**ATTACHMENT 1**  
**FLOODPLAIN MANAGEMENT CONSIDERATIONS**

March 9, 2015

Mr. Tim Ellis  
911 Administrator  
Lawrence County Floodplain Coordinator  
P.O. Box 566  
Louisa, KY 41230

Re: Application for Permit to Construct Across or Along a Stream and/or  
Water Quality Certification (Floodplain Management Considerations)  
Big Sandy Fly Ash Pond Closure Project  
Agency Interest #2610  
Lawrence County, Kentucky

Dear Mr. Ellis,

On behalf of Kentucky Power Company (Kentucky Power), an operating company for American Electric Power (AEP), URS will be submitting an Application for a Permit to Construct Across or Along a Stream and/or Water Quality Certification (permit application) to Kentucky Department for Environmental Protection (KYDEP), Division of Water (KDOW) for construction activities associated with the permanent closure of the Big Sandy fly ash pond located near Louisa, in Lawrence County, Kentucky (hereafter, the Project). Prior to submitting the permit application, coordination with your office is required pertaining to work in the floodplain.

The Big Sandy Plant currently plans to decommission Unit 2 and convert Unit 1 to natural gas in 2016. As a result, the Plant will discontinue wet-sludging to the Big Sandy fly ash pond and the pond will no longer be needed for wastewater or fly ash management. The proposed Project will permanently close the Plant's 130-acre wet fly ash pond behind the Horseford Creek Dam adjacent to Blaine Creek. A site vicinity map is provided as Figure 1A in Attachment 1 and an overall site layout map is included as Figure 2 in Attachment 1.

Kentucky Power will permanently close the Big Sandy fly ash pond by draining free water and capping ash in place. Closure will consist of installation of a cap system, main and saddle dam spillways for stormwater management, and an ash pore water management system to collect seepage under the cap. Construction operations will include excavation and grading of fly ash for the cap system, the use of a sump and pump station, and lowering of the Horseford Creek Dam.

Kentucky Power's proposed fly ash pond closure is currently in the final development and design stage. As such, Kentucky Power is currently pursuing permits and regulatory approvals needed for closure of the Big Sandy fly ash pond. Those environmental permits that Kentucky Power has obtained or will be obtaining include an Army Corps of Engineers (USACE) Section 404 Individual Permit, KYDEP Special Waste Landfill Permit, KYDEP Dam Modification Permit, Modified KPDES Discharge Permit from KDOW, US Fish and Wildlife Service Section 7 Consultation, and Kentucky Heritage Council Section 106 Consultation.

The proposed construction activities will also require coverage under the Permit to Construct Across or Along a Stream and an Individual Kentucky Section 401 Water Quality Certification. It should be noted that during the design process, efforts were made to minimize impacts to the 100-year floodplain of Blaine Creek, waters of the United States and/or Commonwealth of Kentucky, wetland areas and other sensitive features.

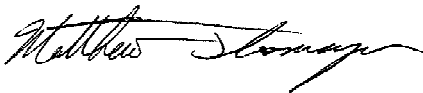
The Project involves grading and construction modifications to the main dam spillway, of which a portion is located within the 100-year floodplain of Blaine Creek as shown in Figure 1C in Attachment 1. Attachment 1 provides additional and specific floodplain management information for your consideration.

We request your office review and approve (via signature of the attached permit application form) the information contained herein, which will subsequently be used to request an Individual Kentucky Section 401 Water Quality Certification. Please send the signed form to our office (address provided on page 1).

We appreciate your timely review of this information, and we are available to answer any further questions you may have regarding the proposed Project. If you have any questions or require additional information, please feel free to contact the undersigned or Jill Lukehart with AEP at (614) 716-2209.

Sincerely,

URS



Matthew D. Thomayer  
Senior Ecologist/Project Manager  
[Matt.Thomayer@aecom.com](mailto:Matt.Thomayer@aecom.com)

**ENCLOSED**

Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification

**Attachment 1 – Floodplain Management Considerations**

- Summary of Floodplain Management Considerations
- Figure 1A – Current Site Conditions
- Figure 1B – Spillway Plan and Profile
- Figure 1C – Development Plan 2: Top of Cap Grades with Floodplain
- Appendix 1A: Screening Analysis of Project Impacts on the 100-year Water Surface Elevations in Blaine Creek in Lawrence County, Kentucky

**APPLICATION FOR PERMIT TO CONSTRUCT ACROSS  
OR ALONG A STREAM AND/OR  
WATER QUALITY CERTIFICATION**

**COMMONWEALTH OF KENTUCKY  
ENERGY AND ENVIRONMENT CABINET  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WATER**

**APPLICATION FOR PERMIT TO CONSTRUCT ACROSS OR ALONG A STREAM  
AND / OR WATER QUALITY CERTIFICATION**

Chapter 151 of the Kentucky Revised Statutes requires approval from the Division of Water prior to any construction or other activity in or along a stream that could in any way obstruct flood flows or adversely impact water quality. *If the project involves work in a stream, such as bank stabilization, dredging or relocation, a 401 Water Quality Certification (WQC) from the Division of Water will be required.* This completed form will be forwarded to the Water Quality Branch for WQC processing. The project may not start until all necessary approvals are received from the KDOW. For questions concerning the WQC process, contact the WQC section at 502/564-3410.

If the project will disturb more than 1 acre of soil, A Notice of Intent for Storm Water Discharges will also be required. Both forms must be returned to the Floodplain Management Section of the Division of Water.

1. **OWNER:** Kentucky Power Company dba American Electric Power – Big Sandy Plant  
Give name of person(s), company, governmental unit, or other owner of proposed project.

**MAILING ADDRESS:** c/o Alan R. Wood, 1 Riverside Plaza, Columbus, Ohio 43215

**TELEPHONE #:** (614) 716-1233 **EMAIL:** arwood@aep.com

2. **AGENT:** Matthew Thomayer  
Give name of person(s) submitting application, if other than owner.

**ADDRESS:** 525 Vine Street, Suite 1800, Cincinnati, Ohio 45202

**TELEPHONE #:** (513) 651-3440 **EMAIL:** matt.thomayer@aecom.com

3. **ENGINEER:** Thomas Kovacic **P.E. NUMBER:** 20958  
Contact Division of Water if waiver can be granted.

**TELEPHONE #:** (216) 622-2420 **EMAIL:** thomas.kovacic@aecom.com

4. **DESCRIPTION OF CONSTRUCTION:** \_\_\_\_\_  
List the items to be constructed in the floodplain

Closure of Big Sandy Fly Ash Pond: Construction of Fly Ash Pond Cap System, Main Dam and Saddle Dam Spillways, and Lowering of Horseford Creek Dam. See additional attachments to this submittal for more detailed explanation.

5. **COUNTY:** Lawrence **NEAREST COMMUNITY:** Louisa, KY

6. **USGS QUAD NAME** Fallsburg, KY and Prichard, WV **LATITUDE/LONGITUDE:** 38.181623/-82.640234

7. **STREAM NAME:** Blaine Creek **WATERSHED SIZE (in acres):** Blaine Creek -14,781 acres

8. **LINEAR FEET OF STREAM IMPACTED:** 4,071

9. **DIRECTIONS TO SITE:** From Frankfort, KY; head east on I-64, take exit 191 (US-23) and follow US-23 south to Big Sandy Power Plant. Site can be accessed by an unnamed haul road west of US 23, across from plant.

10. IS ANY PORTION OF THE REQUESTED PROJECT NOW COMPLETE?  Yes x No If yes, identify the completed portion on the drawings you submit and indicate the date activity was completed. DATE: \_\_\_\_\_
11. ESTIMATED BEGIN CONSTRUCTION DATE: Tree clearing, October 2015; Major Construction, April 2016
12. ESTIMATED END CONSTRUCTION DATE: December 2019
13. HAS A PERMIT BEEN RECEIVED FROM THE US ARMY, CORPS of ENGINEERS?  Yes x No If yes, attach a copy of that permit.
14. THE APPLICANT *MUST* ADDRESS PUBLIC NOTICE:

(a) PUBLIC NOTICE HAS BEEN GIVEN FOR THIS PROPOSAL BY THE FOLLOWING MEANS:

- Public notice in newspaper having greatest circulation in area (provide newspaper clipping or affidavit)
- Adjacent property owner(s) affidavits (Contact Division of Water for requirements.)

(b) x I REQUEST WAIVER OF PUBLIC NOTICE BECAUSE:

Kentucky Power is requesting that the Public Notice for the floodplain approval to be waived since the impacts to the floodplain are negligible. Furthermore, the Public Notice will be covered through the USACE Individual 404 Public Notice and/or the 401 Individual Permit Application.

Contact Division of Water for requirements.

15. I HAVE CONTACTED THE FOLLOWING CITY OR COUNTY OFFICIALS CONCERNING THIS PROJECT:

Lawrence County Floodplain Coordinator

Give name and title of person(s) contacted and provide copy of any approval city or county may have issued.

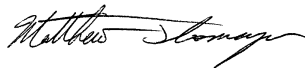
16. LIST OF ATTACHMENTS: Materials provided in this submittal binder, which includes descriptions, tables, drawings and figures.

List plans, profiles, or other drawings and data submitted. Attach a copy of a 7.5 minute USGS topographic map clearly showing the project location.

17. I, Alan R. Wood (owners Initials) CERTIFY THAT THE OWNER OWNS OR HAS EASEMENT RIGHTS ON ALL PROPERTY ON WHICH THIS PROJECT WILL BE LOCATED OR ON WHICH RELATED CONSTRUCTION WILL OCCUR (for dams, this includes the area that would be impounded during the design flood).

18. REMARKS: \_\_\_\_\_

I hereby request approval for construction across or along a stream as described in this application and any accompanying documents. To the best of my knowledge, all the information provided is true and correct.



SIGNATURE: \_\_\_\_\_

Owner or Agent sign here. (If signed by Agent, a Power of Attorney should be attached.)

DATE: 3/9/2015

SIGNATURE OF LOCAL FLOODPLAIN COORDINATOR:

Permit application will be returned to applicant if not properly endorsed by the local floodplain coordinator.

DATE: \_\_\_\_\_

SUBMIT APPLICATION AND ATTACHMENTS TO:

Floodplain Management Section  
Division of Water  
200 Fair Oaks Lane  
Frankfort, KY 40601

**ATTACHMENT 1**

**FLOODPLAIN MANAGEMENT CONSIDERATIONS**

**ATTACHMENT 1  
FLOODPLAIN MANAGEMENT  
CONSIDERATIONS**

**BIG SANDY FLY ASH  
POND CLOSURE PROJECT**

*Prepared for:*  
Kentucky Power dba AEP  
23000 US Highway 23  
Louisa, Kentucky 41230



525 Vine Street, Suite 1800  
Cincinnati, Ohio 45202

March 2015



## **1.0 INTRODUCTION**

The purpose of this attachment is to describe the specific construction activities subject to the Kentucky Division of Water (KDOW) Stream Construction Permit and to summarize information supporting the “No Impact” Certification for the proposed project. In order for Kentucky Power to close an approximately 130-acre fly ash pond near Louisa in Lawrence County, Kentucky, minor grading and construction in the 100-year floodplain of Blaine Creek will be required for reconstruction of the main dam spillway. Floodplain management considerations associated with these activities are the subject of this attachment.

## **2.0 DESCRIPTION OF SITE ACTIVITIES WITHIN 100-YEAR FLOODPLAIN**

A current site layout of the Big Sandy fly ash pond is provided as Figure 1A. The specific areas subject to this section of the Stream Construction Permit application involve construction activity within the 100-year floodplain of Blaine Creek. These proposed construction areas include lowering of Horseford Dam (i.e., main dam) and modification to the existing spillway to Blaine Creek.

The following sections further discuss the components of the proposed Project. A detailed map of the work at the spillway is provided in Figure 1B.

### **MAIN DAM & SPILLWAY MODIFICATIONS**

Lowering the main dam along with constructing a new spillway will require the surrounding areas to be filled and graded (Figure 1B). The main dam spillway will require an overcut of two feet be made, and the entire top surface will be covered with 18 inches of compacted clay followed by 6 inches of vegetative cover soil. The main dam spillway will be completed with a combination of rip-rap and concrete.

## **3.0 PROJECT EFFECT ON FLOOD CONDITIONS**

As described in Section 2.0, the Project involves grading and construction modifications to the main dam spillway, of which a portion is located within the 100-year floodplain of Blaine Creek as shown in Figure 1C. In order to analyze the effects of the proposed floodplain construction and post-construction stormwater flows on existing flood conditions, URS modeled existing and proposed conditions using the United States Army Corps of Engineer’s Hydrologic Engineering Centers River Analysis System (HEC-RAS).

URS prepared both Existing Conditions and Proposed Conditions HEC-RAS models of Blaine Creek downstream of the Big Sandy Fly Ash Pond Closure project. These HEC-RAS models were created from the most recent FEMA HEC-2 modeling output and FEMA Effective and

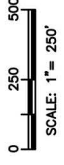
Preliminary FIS information. The Proposed Conditions HEC-RAS models included the addition of the 100-year, 24-hour channel flows from the saddle dam and main dam watersheds to the existing FEMA 100-year flows in Blaine Creek downstream of the project. A comparison of output from the Existing Conditions and Proposed Conditions HEC-RAS models showed that increases in the 100-year water surface elevations in Blaine Creek by the channel flow from the Saddle Dam and Main Dam watersheds will be less than 0.06 feet, and therefore should be considered negligible. The HEC-RAS analysis is documented in Appendix 1A.

#### **4.0 SUMMARY**

AEP is proposing to permanently close an approximately 130-acre fly ash pond near Louisa, Kentucky in Lawrence County. In order to close the fly ash pond, AEP will need to implement certain activities involving the construction and grading in the 100-year floodplain of Blaine Creek associated with reconstruction of the main dam spillway. URS has modeled this proposed structure within 100-year floodplain and post-construction stormwater conditions. Based on this modeling, the proposed construction will result in a negligible change to downstream flood conditions.

DWG. NO. 13-30161-B

EXISTING MAJOR CONTOURS  
 EXISTING MINOR CONTOURS  
 AEP PROPERTY BOUNDARY  
 EXISTING WETLAND  
 EXISTING STREAM  
 EXISTING WATER ELEVATION  
 EXISTING VEGETATION  
 EXISTING ROAD  
 BORING/MONITORING WELL LOCATION  
 LIMIT OF DISTURBANCE  
 PROPOSED BORROW AREA



NOTES:  
 1. TOPOGRAPHY PROVIDED BY HENDERSON AERIAL SURVEYS INC (GROVE CITY, OHIO) VIA AERIAL PHOTOGRAMETRIC SURVEY CONDUCTED IN 2007 WITH A CONTOUR INTERVAL OF 2 FEET. THIS WAS SUPPLEMENTED WITH BATHYMETRIC SURVEY DATA FROM 2010 AND 2011 IN THE BACK SECTION OF THE POND ON 4/12/12. ASH POND ELEVATION FOR THE SHALLOW WATER SECTION WAS DETERMINED BY A SURVEY PERFORMED BY AEP IN APRIL 2013.  
 2. THE FINAL BEHAVIOR OF THE CCP MATERIAL CLOSURE IS HIGHLY DEPENDENT ON THE AMOUNT OF COAL BURNED BETWEEN NOW AND THE TIME OF CLOSURE. THE AMOUNT OF COAL BURNED IS A FUNCTION OF THE REGIONAL ELECTRICITY DEMAND, BALANCING OF LOADS WITH OTHER REGIONAL POWER PLANTS, AND THE EFFICIENCY OF THE COAL BURNED. ALL OF THESE FACTORS WILL VARY CONSIDERABLY THROUGHOUT THE REMAINING LIFE OF THE BIG SANDY PLANT.  
 3. THE CLOSURE GRADES PRESENTED ARE BASED ON ESTIMATES OF THE AMOUNT OF COAL BURNED AND THE DATE OF THE MOST RECENT SURVEY DATE AND THE DATE OF CLOSURE. CLOSURE GRADES DEPICTED ARE INTENDED TO PROVIDE A GENERAL CONCEPT OF ACTUAL CLOSURE GRADES FOR PORTIONS OF THE FACILITY. THE EXACT CLOSURE GRADES MAY VARY TO REFLECT AS NEEDED. IT IS INTENDED THAT THE MAJORITY OF THE SITE MATERIALS WILL BE REMOVED TO GRADE OF APPROXIMATELY 25%.  
 4. FOR BORING LOCATIONS AND INFORMATION SEE THE HYDROLOGIC SITE INVESTIGATION, ATTACHMENT 30 OF THE PERMIT APPLICATION.  
 5. THE CLOSURE GRADES PRESENTED ARE BASED ON ESTIMATES OF THE AMOUNT OF COAL BURNED AND THE DATE OF THE MOST RECENT SURVEY DATE AND THE DATE OF CLOSURE. CLOSURE GRADES DEPICTED ARE INTENDED TO PROVIDE A GENERAL CONCEPT OF ACTUAL CLOSURE GRADES FOR PORTIONS OF THE FACILITY. THE EXACT CLOSURE GRADES MAY VARY TO REFLECT AS NEEDED. IT IS INTENDED THAT THE MAJORITY OF THE SITE MATERIALS WILL BE REMOVED TO GRADE OF APPROXIMATELY 25%.

REVISIONS  
 DATE NO. DESCRIPTION APPROVED  
 7/30/15 B REVISION BASED ON KENTUCKY PERMITTING REQUIREMENTS  
 8/14/13 A ISSUED FOR PERMIT - INITIAL

KENTUCKY POWER COMPANY  
 BIG SANDY PLANT  
 KENTUCKY  
 CURRENT SITE CONDITIONS  
 ATTACHMENT 20

DWG. NO. 13-30161-B  
 SCALE: 1"=250'  
 PROJECT NO: 13815151  
 DESIGNED BY: LEC  
 DRAWN BY: LEC  
 APPROVED BY: TAK

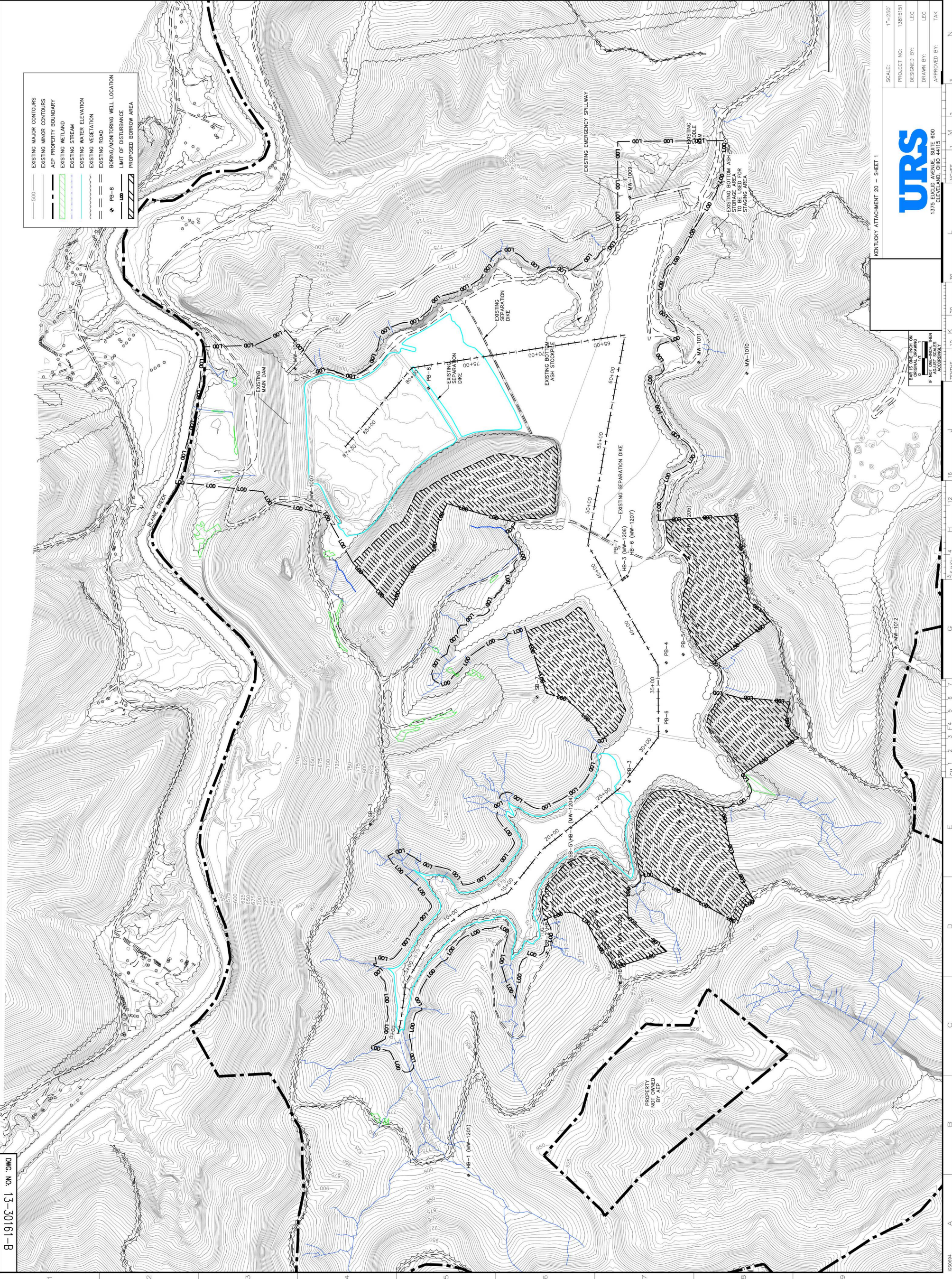
URS  
 1375 EUCLID AVENUE, SUITE 600  
 CLEVELAND, OHIO 44115

AEP SERVICE CORP.  
 RIVERSIDE PLAZA  
 COLUMBUS, OH 43215

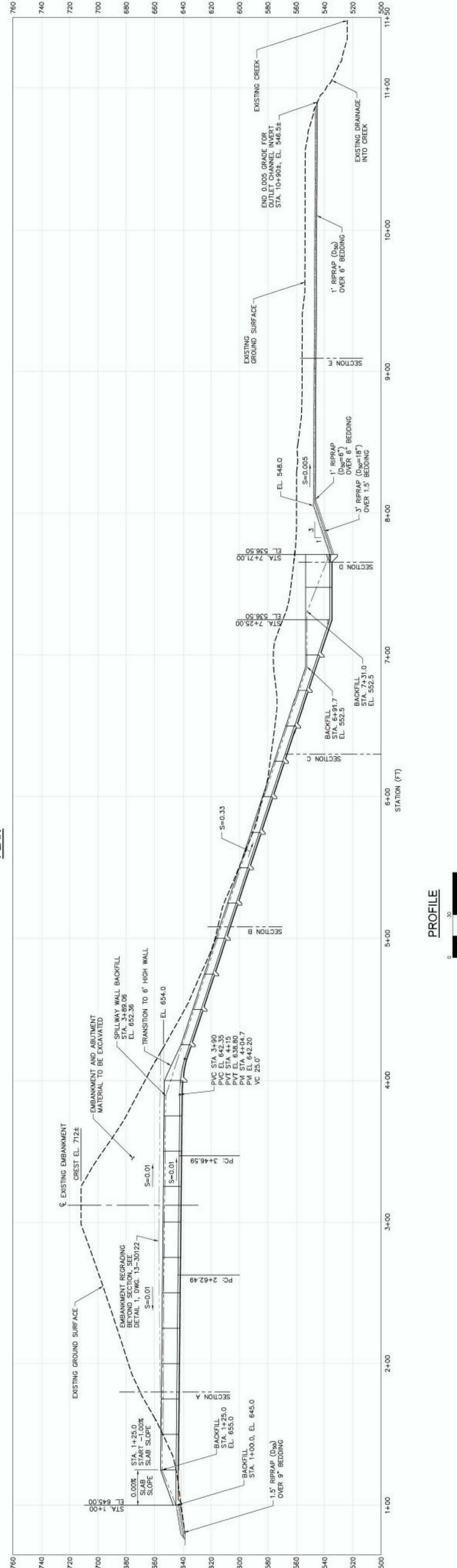
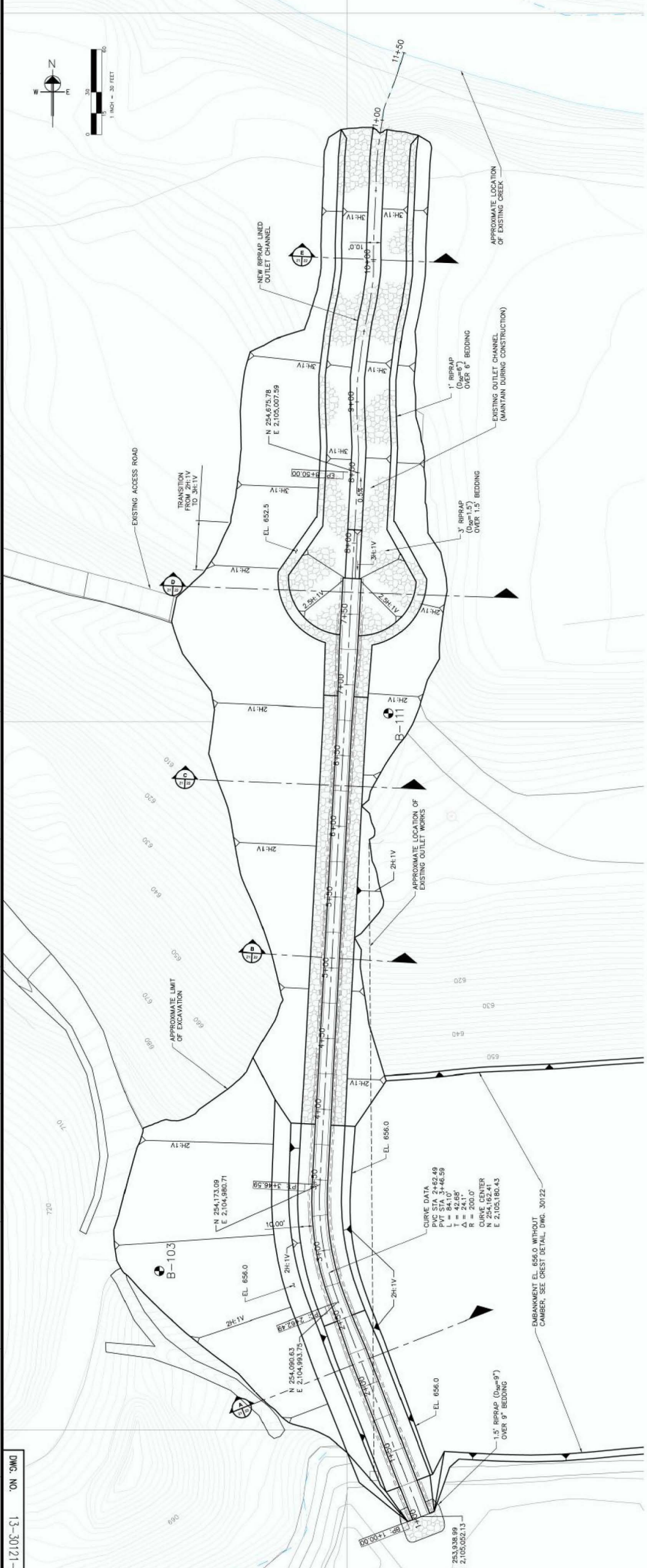
Fig. 1A

KENTUCKY ATTACHMENT 20 - SHEET 1

THIS DRAWING IS THE PROPERTY OF THE AMERICAN ELECTRIC POWER SERVICE CORP. AND IS LOANED TO YOU FOR YOUR USE ONLY. IT IS NOT TO BE REPRODUCED, COPIED, OR USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF AEP SERVICE CORP. FOR ANY PURPOSES, TECHNICAL OR OTHER, AND IS TO BE RETURNED UPON REQUEST.



D-12105-31 ON DWG



SCALE: 1"=30'

PROJECT NO: 13810151

DESIGNED BY: C-JY

DRAWN BY: WDH

APPROVED BY: [Signature]

DATE: 06/05/13

DESCRIPTION: 100% SUBMITTAL-URS

# URS

**Fig. 1B**

SPILLWAY  
PLAN AND PROFILE

KENTUCKY POWER COMPANY  
BIG SANDY PLANT

LOUISA KENTUCKY

DWG. NO. 13-30121-D

CIVIL ENGINEERING DESIGN

1"=30' FEET

1"=30' FEET

06/05/13 D 100% SUBMITTAL-URS

04/26/13 C 90% SUBMITTAL-URS

02/20/13 B 70% SUBMITTAL-URS

12/03/12 A 30% SUBMITTAL-URS

REVISIONS

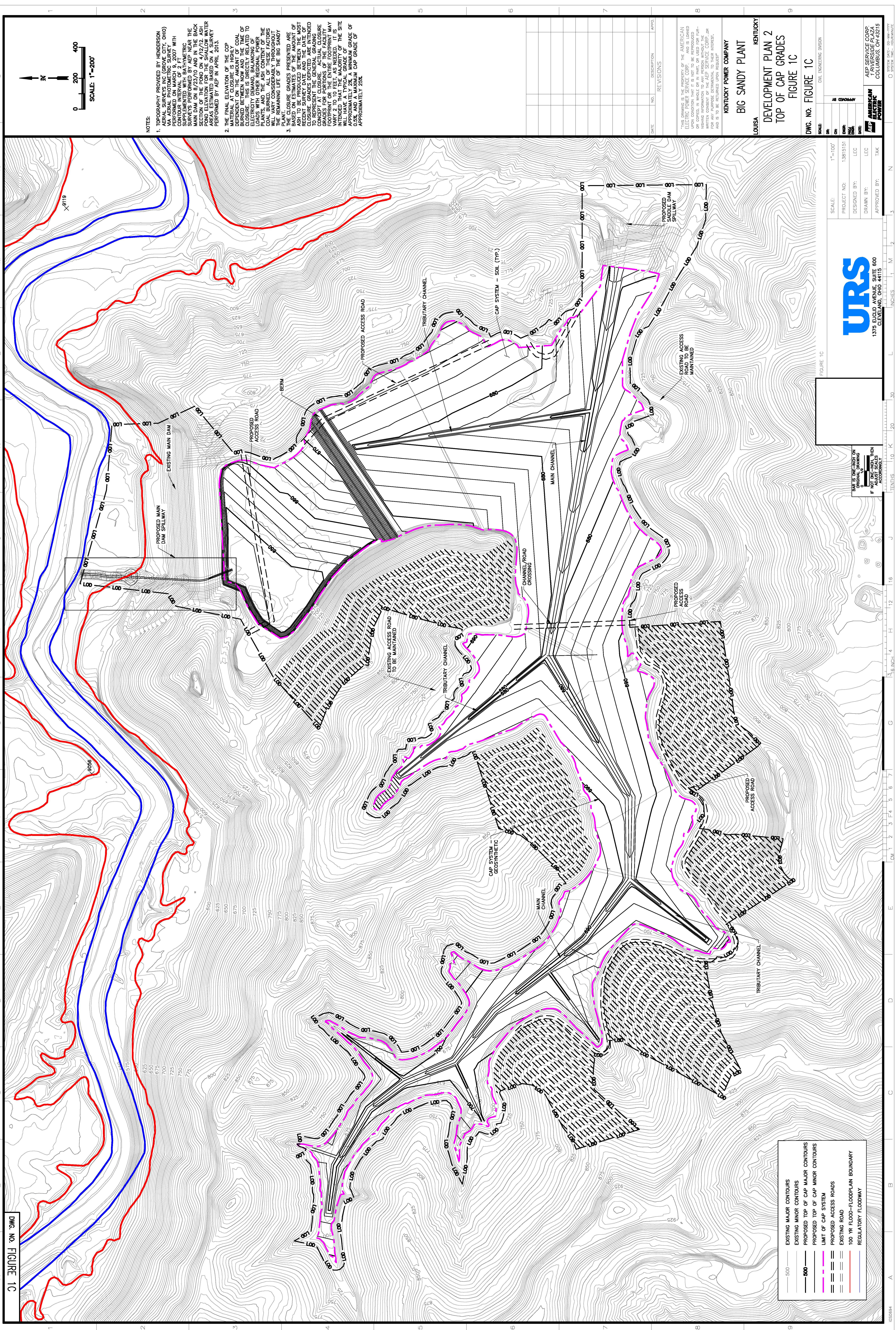
NO.	DESCRIPTION	DATE
A	30% SUBMITTAL-URS	12/03/12
B	70% SUBMITTAL-URS	02/20/13
C	90% SUBMITTAL-URS	04/26/13
D	100% SUBMITTAL-URS	06/05/13

THIS DRAWING IS THE PROPERTY OF THE AMERICAN ELECTRIC POWER SERVICE CORP. AND IS LOANED TO YOU FOR YOUR USE ONLY. IT IS TO BE KEPT IN YOUR OFFICE AND IS TO BE RETURNED UPON REQUEST.

FOR ANY INFORMATION TO ANY DESIGN, CONTACT THE PROJECT MANAGER AT THE ADDRESS ABOVE.

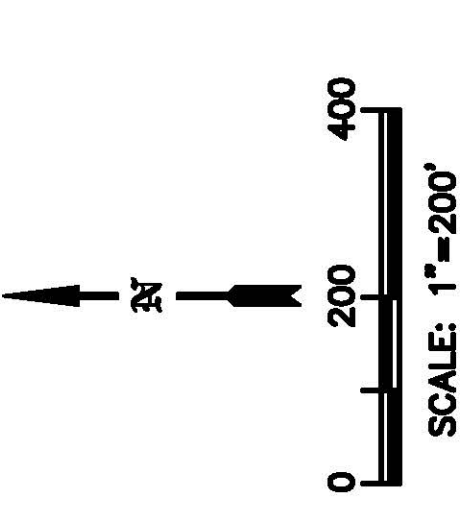
FOR ANY INFORMATION TO ANY DESIGN, CONTACT THE PROJECT MANAGER AT THE ADDRESS ABOVE.

AMERICAN ELECTRIC POWER SERVICE CORP.  
RIVERSIDE PLAZA  
COLUMBUS, OH 43215



NOTES:

1. TOPOGRAPHY PROVIDED BY HENDERSON AERIAL SURVEYS INC (GROVE CITY, OHIO) ON 11/11/10. SURVEY CONDUCTED ON MARCH 9, 2007 WITH CONTOUR INTERVAL OF 2 FT. METRIC SURVEYS PERFORMED BY AEP NEAR THE MAIN DAM ON 8/23/10 AND IN THE BACK SECTION OF THE POND ON 4/12/12. ASH AREAS ESTIMATED BASED ON A SURVEY PERFORMED BY AEP IN APRIL 2013.
2. THE FINAL ELEVATION OF THE CCP MATERIAL AT CLOSURE IS HIGHLY VARIABLE AND WILL BE DETERMINED BY THE AMOUNT OF MATERIAL BURIED BETWEEN NOW AND THE TIME OF CLOSURE. THIS IS DIRECTLY RELATED TO THE VARIATION IN THE AMOUNT OF ASH LOADS WITH OTHER REGIONAL POWER PLANTS, AND THE ASH CONTENT OF THE ASH. THIS VARIATION IN ASH CONTENTS WILL VARY CONSIDERABLY THROUGHOUT THE REMAINING LIFE OF THE BIG SANDY.
3. THE CLOSURE GRADES PRESENTED ARE BASED ON ESTIMATES OF THE AMOUNT OF ASH TO BE PRODUCED BETWEEN THE MOST AGGRESSIVE CLOSURE SCENARIOS AND INTENDED TO REPRESENT THE GENERAL GRADING GRADES FOR PORTIONS OF THE FACILITY FOOTPRINT OR THE ENTIRE FOOTPRINT MAY VARY FROM THE GENERAL GRADING INTENDED THAT THE MAJORITY OF THE SITE WILL HAVE A TYPICAL GRADE OF APPROXIMATELY 0.5% AND A MAXIMUM GRP GRADE OF APPROXIMATELY 25%.



DATE	NO.	DESCRIPTION	APPROVED

THIS DRAWING IS THE PROPERTY OF THE AMERICAN ELECTRIC POWER SERVICE CORP. AND IS LOANED UNDER CONDITION THAT IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE WRITTEN CONSENT OF THE AEP SERVICE CORP. OR ANY OF ITS AFFILIATES. ANY UNAUTHORIZED REPRODUCTION OR USE IS TO BE RETRIEVED UPON REQUEST.

KENTUCKY POWER COMPANY  
**BIG SANDY PLANT**  
 LOUISA KENTUCKY  
**DEVELOPMENT PLAN 2**  
**TOP OF CAP GRADES**  
**FIGURE 1C**  
**DWG. NO. FIGURE 1C**

SCALE:	1"=100'
PROJECT NO.:	13815151
DESIGNED BY:	LEC
DRAWN BY:	LEC
APPROVED BY:	TAK



FIGURE 1C
SCALE: 1"=100'
PROJECT NO.:
DESIGNED BY:
DRAWN BY:
APPROVED BY:

500	EXISTING MAJOR CONTOURS
600	EXISTING MINOR CONTOURS
---	PROPOSED TOP OF CAP MAJOR CONTOURS
---	PROPOSED TOP OF CAP MINOR CONTOURS
---	LIMIT OF CAP SYSTEM
---	PROPOSED ACCESS ROADS
---	EXISTING ROAD
---	100 YR FLOOD-FLOODPLAIN BOUNDARY
---	REGULATORY FLOODWAY

BAR IS ONE-NOT ON ORIGINAL DRAWING. IF ADJUST SALES ACCURACIES.

DWG. NO. FIGURE 1C

**APPENDIX 1A**

**SCREENING ANALYSIS OF PROJECT IMPACTS ON THE 100-YEAR WATER  
SURFACE ELEVATIONS IN BLAINE CREEK IN LAWRENCE COUNTY,  
KENTUCKY**

## Memorandum

To	Brian Palmer, PE AEP	Page	1
CC	Nick Golden, PE AECOM		
Subject	Screening Analysis of Project Impacts on the 100-year Water Surface Elevations in Blaine Creek in Lawrence County, Kentucky AEP Big Sandy Ash Pond Closure		
From	Jay Mosley, PE, CFM, CPESC AECOM		
Date	February 13, 2015		

This memorandum and attachments summarize a screening analysis to assess the project impacts of the AEP Big Sandy Ash Pond Closure on the 100-year water surface elevations in Blaine Creek immediately downstream of the project in Lawrence County, Kentucky.

AECOM submitted a data request to the Federal Emergency Management Agency (FEMA) Engineering library to obtain the most recently completed modeling for Blaine Creek in the project vicinity. FEMA provided the original HEC-2 program output for the entire reach of Blaine Creek. FEMA Flood Insurance Study (FIS) GIS data was downloaded from the FEMA website (<https://msc.fema.gov/portal>) and this information is presented in Figure 1 in Attachment A. Figure 1 shows the FEMA Flood Hazard Zones, the numbering and location of the cross sections used in the HEC-2 model and the Regulatory Base Flood elevations (100-year water surface elevations) at each cross section. The project site lies within the watersheds that contribute flow to the Blaine Creek between FIS cross sections E and I.

There are two FEMA FIS documents available for Lawrence County Kentucky and Incorporated Areas. The Effective FEMA FIS is dated June 16, 2011 and the Preliminary (pending approval) FEMA FIS is dated June 13, 2014. Portions of the FIS documents are presented in Attachments B and C. Both of these documents state that the 100-year peak discharge in the Blaine Creek is 28,500 cubic feet per second in the project vicinity. The Regulatory Base Flood elevations in both of these FIS documents for Cross Sections A through I on Blaine Creek are 566.7 feet. This indicates that backwater from the Big Sandy River downstream of Cross Section A is controlling the water surface elevations in the lower reach of Blaine Creek in the project vicinity.

Existing Conditions HEC-RAS steady state computer models of Blaine Creek were created from the HEC-2 program output provided by FEMA. Cross Sections A (downstream) through I (upstream) were imported into HEC-RAS. The downstream and upstream boundary conditions at Cross Section A and I were set to be 566.7 feet to match the FEMA Regulatory Base Flood elevations from the FIS documents.

Two models were created to evaluate any difference between the older FEMA HEC-2 model and the newly created HEC-RAS model. One model used the Manning's "n" values listed in

the HEC-2 model output and the other included revised (lowered) Manning “n” values in an attempt to calibrate the Existing Conditions HEC-RAS 100-year water surface elevations in Blaine Creek to more closely replicate the 566.7 feet elevation listed for Cross Sections A through I in both FEMA FIS documents.

The HEC-RAS modeling of the existing conditions was then used to evaluate the impact of the proposed Big Sandy Pond Closure on the 100-year water surface elevations in Blaine Creek. The following table compares the 100-year water surface elevations calculated by the Existing Conditions HEC-RAS model with the HEC-2 Manning’s “n” values to the FEMA Regulatory Base Flood elevation of 556.7 feet.

<b>Comparison of the Existing Conditions HEC-RAS Model to the FEMA Blaine Creek Regulatory Base Flood Elevations (Using HEC-2 Manning's "n" HEC-RAS Model)</b>				
<b>FEMA FIS Cross Section ID</b>	<b>FEMA and Model Cross Section Number</b>	<b>FEMA Regulatory Base Flood Elevation (ft)</b>	<b>HEC-RAS Model W.S. Elevation (ft)</b>	<b>Difference From FEMA 100 year (ft)</b>
<b>Upstream</b>				
<b>O</b>	210	566.7	567.94	1.24
<b>H</b>	209	566.7	567.69	0.99
<b>G</b>	208	566.7	567.62	0.92
<b>F</b>	207	566.7	567.33	0.63
<b>E</b>	206	566.7	567.29	0.59
<b>D</b>	205	566.7	567.13	0.43
<b>C</b>	204	566.7	566.96	0.26
<b>B</b>	203	566.7	566.65	-0.05
<b>A</b>	202.7	566.7	566.7	0
<b>Downstream</b>				

The following table compares the 100-year water surface elevations calculated by the Existing Conditions HEC-RAS model with the revised Manning’s “n” values to the FEMA Regulatory Base Flood elevation of 556.7 feet.



Comparison of the Existing Conditions HEC-RAS Model to the FEMA Blaine Creek Regulatory Base Flood Elevations (Using Revised Manning's "n" HEC-RAS Model)				
FEMA FIS Cross Section ID	FEMA and Model Cross Section Number	FEMA Regulatory Base Flood Elevation (ft)	HEC-RAS Model W.S. Elevation (ft)	Difference From FEMA 100 year (ft)
<b>Upstream</b>				
<b>O</b>	210	566.7	566.94	0.24
<b>H</b>	209	566.7	566.89	0.19
<b>G</b>	208	566.7	566.89	0.19
<b>F</b>	207	566.7	566.84	0.14
<b>E</b>	206	566.7	566.82	0.12
<b>D</b>	205	566.7	566.77	0.07
<b>C</b>	204	566.7	566.72	0.02
<b>B</b>	203	566.7	566.7	0
<b>A</b>	202.7	566.7	566.7	0
<b>Downstream</b>				

A Proposed Conditions HEC-RAS model was created to assess the impact of the Big Sandy Ash Pond closure channel flows on the two Existing Conditions HEC-RAS models. The 100-year, 24-hour channel flows of 844 cfs and 216 cfs for the Saddle Dam and the Main Dam watersheds respectively were obtained from in a document entitled " *Big Sandy Ash Pond Closure – Design Basis and Dam Safety Summary*" (URS, November 20, 2012). These channel flows were added to the Proposed Conditions HEC-RAS model at Cross Sections E and G respectively. A comparison of the Proposed Conditions HEC-RAS model (with the additional Saddle Dam and the Main Dam channel flows) to the Existing Conditions HEC-RAS Model with the HEC-2 Manning's "n" cross sections showed that the addition of the channel flows in Blaine Creek raised the water surface from 0.0 feet to 0.06 feet at all cross sections (see the following summary table).

Impact of Big Sandy Channel Flows on the Blaine Creek Regulatory Base Flood Elevations (Using HEC-2 Manning's "n" Existing Conditions HEC-RAS Model)					
FEMA FIS Cross Section ID	FEMA and Model Cross Section Number	HEC-RAS Model Profile	Q Total (cfs)	Computed Water Surface Elevation (ft)	Difference From Existing Conditions Model FEMA 100 year (ft)
<b>Upstream</b>					
<b>I</b>	210	Existing 100 year	28,500	567.94	
	210	Proposed Conditions	28,500	567.99	0.05
<b>H</b>	209	Existing 100 year	28,500	567.69	
	209	Proposed Conditions	28,500	567.75	0.06
<b>Main Dam Channel Flows Enter</b>					
<b>G</b>	208	Existing 100 year	28,500	567.62	
	208	Proposed Conditions	28,716	567.67	0.05
<b>F</b>	207	Existing 100 year	28,500	567.33	
	207	Proposed Conditions	28,716	567.38	0.05
<b>Saddle Dam Channel Flows Enter</b>					
<b>E</b>	206	Existing 100 year	28,500	567.29	
	206	Proposed Conditions	29,560	567.33	0.04
<b>D</b>	205	Existing 100 year	28,500	567.13	
	205	Proposed Conditions	29,560	567.16	0.03
<b>C</b>	204	Existing 100 year	28,500	566.96	
	204	Proposed Conditions	29,560	566.98	0.02
<b>B</b>	203	Existing 100 year	28,500	566.65	
	203	Proposed Conditions	29,560	566.65	0
<b>A</b>	202.7	Existing 100 year	28,500	566.7	
	202.7	Proposed Conditions	29,560	566.7	0
<b>Downstream</b>					

A comparison of the Proposed Conditions HEC-RAS model (with the additional Saddle Dam and the Main Dam channel flows) to the Existing Conditions HEC-RAS Model with the Revised Manning's "n" cross sections showed that the addition of the channel flows in Blaine Creek raised the water surface from 0.0 feet to 0.02 feet at all cross sections (see the following summary table).

Impact of Big Sandy Channel Flows on the Blaine Creek Regulatory Base Flood Elevations (Using the Revised Manning's "n" Existing Conditions HEC-RAS Model)					
FEMA FIS Cross Section ID	FEMA and Model Cross Section Number	HEC-RAS Model Profile	Q Total (cfs)	Computed Water Surface Elevation (ft)	Difference From Existing Conditions Model FEMA 100 year (ft)
<b>Upstream</b>					
I	210	Existing 100 year	28,500	566.94	
	210	Proposed Conditions	28,500	566.96	0.02
H	209	Existing 100 year	28,500	566.89	
	209	Proposed Conditions	28,500	566.91	0.02
<b>Main Dam Channel Flows Enter</b>					
G	208	Existing 100 year	28,500	566.89	
	208	Proposed Conditions	28,716	566.9	0.01
F	207	Existing 100 year	28,500	566.84	
	207	Proposed Conditions	28,716	566.85	0.01
<b>Saddle Dam Channel Flows Enter</b>					
E	206	Existing 100 year	28,500	566.82	
	206	Proposed Conditions	29,560	566.83	0.01
D	205	Existing 100 year	28,500	566.77	
	205	Proposed Conditions	29,560	566.77	0
C	204	Existing 100 year	28,500	566.72	
	204	Proposed Conditions	29,560	566.72	0
B	203	Existing 100 year	28,500	566.7	
	203	Proposed Conditions	29,560	566.7	0
A	202.7	Existing 100 year	28,500	566.7	
	202.7	Proposed Conditions	29,560	566.7	0
<b>Downstream</b>					

## **Conclusion**

AECOM prepared both Existing Conditions and Proposed Conditions HEC-RAS models of Blaine Creek downstream of the Big Sandy Pond Closure project. These HEC-RAS models were created from the most recent FEMA HEC-2 modeling output and FEMA Effective and Preliminary FIS information. The Proposed Conditions HEC-RAS models included the addition of the 100-year, 24-hour channel flows from the Saddle Dam and Main Dam watersheds to the existing FEMA 100-year flows in Blaine Creek downstream of the project. A comparison of the output from the Existing Conditions and Proposed Conditions HEC-RAS models showed that increases in the 100-year water surface elevations in Blaine Creek by the channel flow from the Saddle Dam and Main Dam watersheds will be less than 0.06 feet and therefore should be considered negligible.

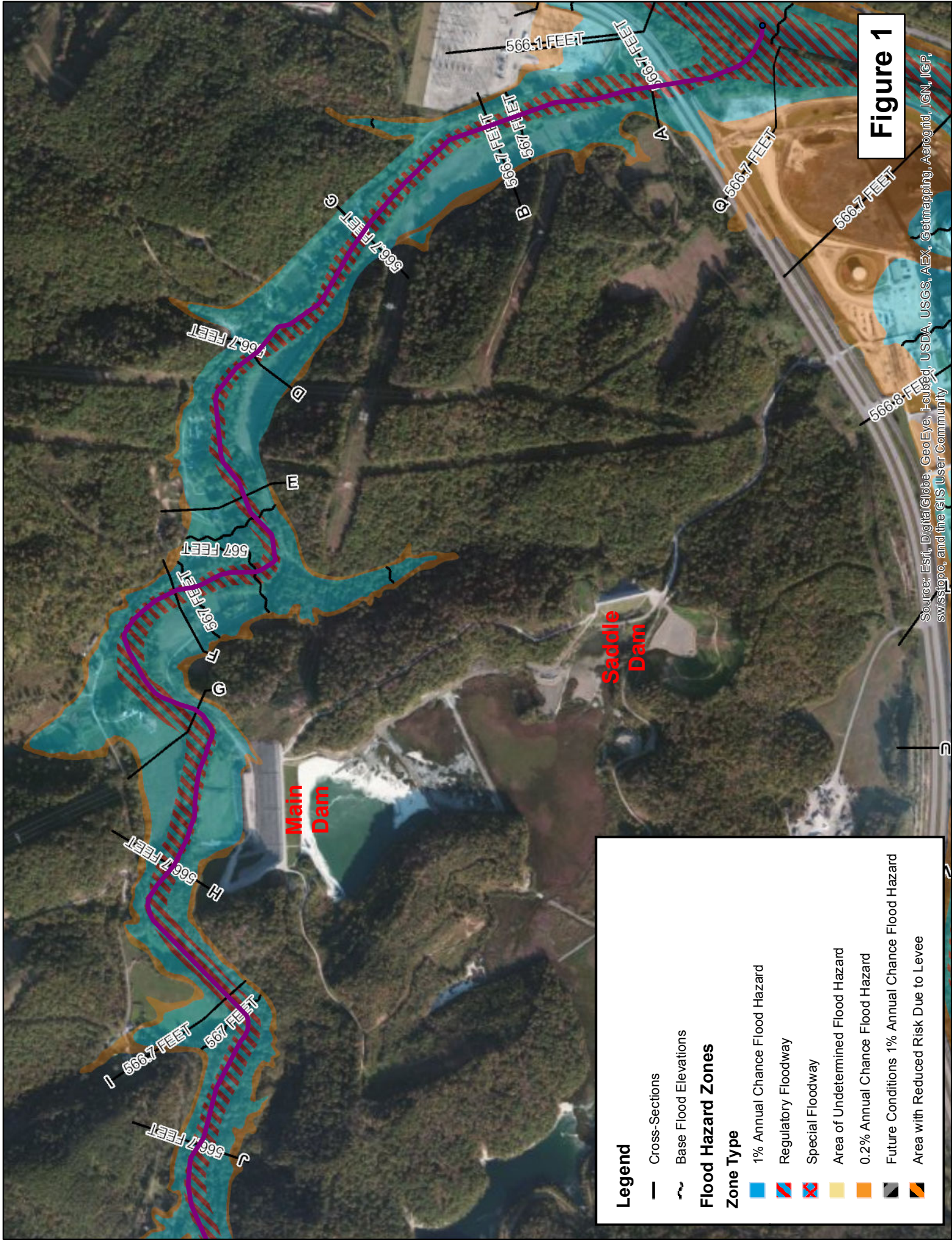
## **Attachments**

- A Figure 1
- B FEMA Effective FIS Information
- C FEMA Preliminary FIS Information

Cc: file

**Attachment A**

**Figure 1**



**Figure 1**

**Legend**

- Cross-Sections
- ~ Base Flood Elevations

**Flood Hazard Zones**

**Zone Type**

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**Attachment B**

**FEMA Effective FIS Information**



# FLOOD INSURANCE STUDY



## LAWRENCE COUNTY, KENTUCKY AND INCORPORATED AREAS

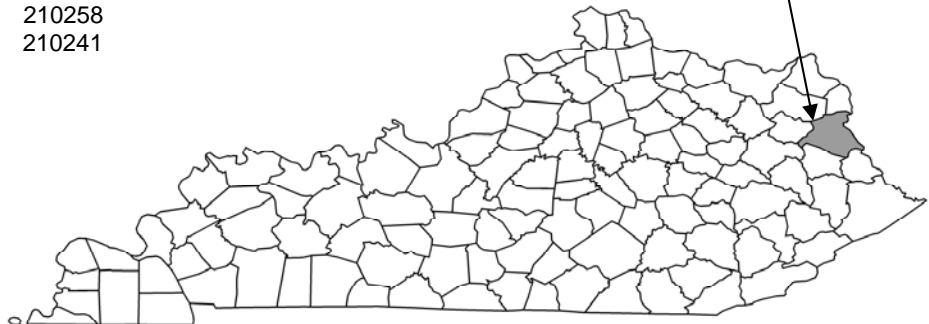
**COMMUNITY  
NAME**

BLAINE, CITY OF  
LAWRENCE COUNTY  
(UNINCORPORATED AREAS)  
LOUISA, CITY OF

**COMMUNITY  
NUMBER**

210458  
210258  
210241

Lawrence  
County



EFFECTIVE DATE JUNE 16, 2011

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

21127CV000A



TABLE 2 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cubic feet per second)</u>			
		<u>10-Percent Annual Chance</u>	<u>2-Percent- Annual- Chance</u>	<u>1-Percent- Annual- Chance</u>	<u>0.2-Percent Annual Chance</u>
<b>BIG SANDY RIVER</b>					
At confluence with Ohio River	4,290	86,200	124,300	143,200	191,000*
At River Mile 26.12 (Gage near City of Louisa, Kentucky)	3,892	78,200	116,300	137,200	194,000
At River Mile 25.99	3,882	78,200	116,300	137,200	194,000
At confluence of Tug & Levisa Forks (Mile 26.84)	3,878	78,200	116,300	137,200	194,000
At River Mile 19.66 (just upstream of Blaine Creek)	3,900	76,000	104,900	118,700	152,600
<b>BLAINE CREEK</b>					
At confluence with Big Sandy River	265.0	15,800	24,400	28,500	38,800
At Yatesville Gage (River Mile 14.44)	217.0	11,100	17,500	20,700	30,000
At River Mile 41.42	79.5	6,500	10,200	11,800	16,300
Just upstream of lower Laurel Creek	46.8	4,300	6,800	8,000	11,000
<b>LEFT FORK BLAINE CREEK</b>					
At confluence with Blaine Creek	18.4	2,170	3,470	4,100	5,700
Just upstream of Keaton Fork (Mile 2.12)	11.2	1,510	2,430	2,990	4,040
<b>RIGHT FORK BLAINE CREEK</b>					
At confluence with Blaine Creek	10.7	1,480	2,370	2,800	3,900
Just upstream of Wiley Branch	5.0	850	1,400	1,650	2,330
<b>LEVISA FORK</b>					
At River Mile 24.74	2,225	56,000	69,200	76,000	97,800
At confluence with Big Sandy River	2,320	47,400	65,600	74,400	98,600

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY <sup>2</sup>	WITH FLOODWAY	INCREASE	
BLAINE CREEK									
A	0.19	227	4,781	6.0	566.7	548.8	549.6	0.8	
B	0.46	134	4,016	7.1	566.7	549.6	550.2	0.6	
C	0.73	150	4,242	6.7	566.7	549.9	550.6	0.7	
D	1.00	129	3,818	7.5	566.7	550.3	551.0	0.7	
E	1.26	147	4,231	6.7	566.7	551.0	551.7	0.7	
F	1.54	165	4,363	6.5	566.7	551.5	552.2	0.7	
G	1.82	246	4,238	6.7	566.7	552.6	553.5	0.3	
H	2.09	202	4,404	6.5	566.7	553.3	554.1	0.8	
I	2.36	177	4,875	5.8	566.7	554.7	555.5	0.8	
J	2.63	199	5,125	5.6	566.7	555.0	555.8	0.8	
K	2.91	184	5,020	5.7	566.7	555.6	556.3	0.7	
L	3.17	245	5,939	4.8	566.7	556.2	557.0	0.8	
M	3.45	158	4,076	7.0	566.7	556.5	557.2	0.7	
N	3.71	180	4,683	6.1	566.7	558.1	559.0	0.9	
O	3.98	301	5,840	4.9	566.7	558.6	559.5	0.9	
P	4.24	270	5,315	5.4	566.7	559.6	560.4	0.8	
Q	4.57	391	7,208	4.0	566.7	560.1	561.1	1.0	
R	4.85	260	6,105	4.7	566.7	560.6	561.4	0.8	
S	5.25	176	4,271	6.7	566.7	560.9	561.9	1.0	
T	5.42	142	3,610	7.9	566.7	561.1	561.9	0.8	
U	5.60	289	6,141	4.6	566.7	563.3	564.1	0.8	
V	5.93	228	4,942	5.8	566.7	564.0	564.9	0.9	
W	6.36	154	4,033	7.1	566.7	564.7	565.4	0.7	

<sup>1</sup>Miles above confluence with Big Sandy River

<sup>2</sup>Elevations without considering backwater effect from Big Sandy River

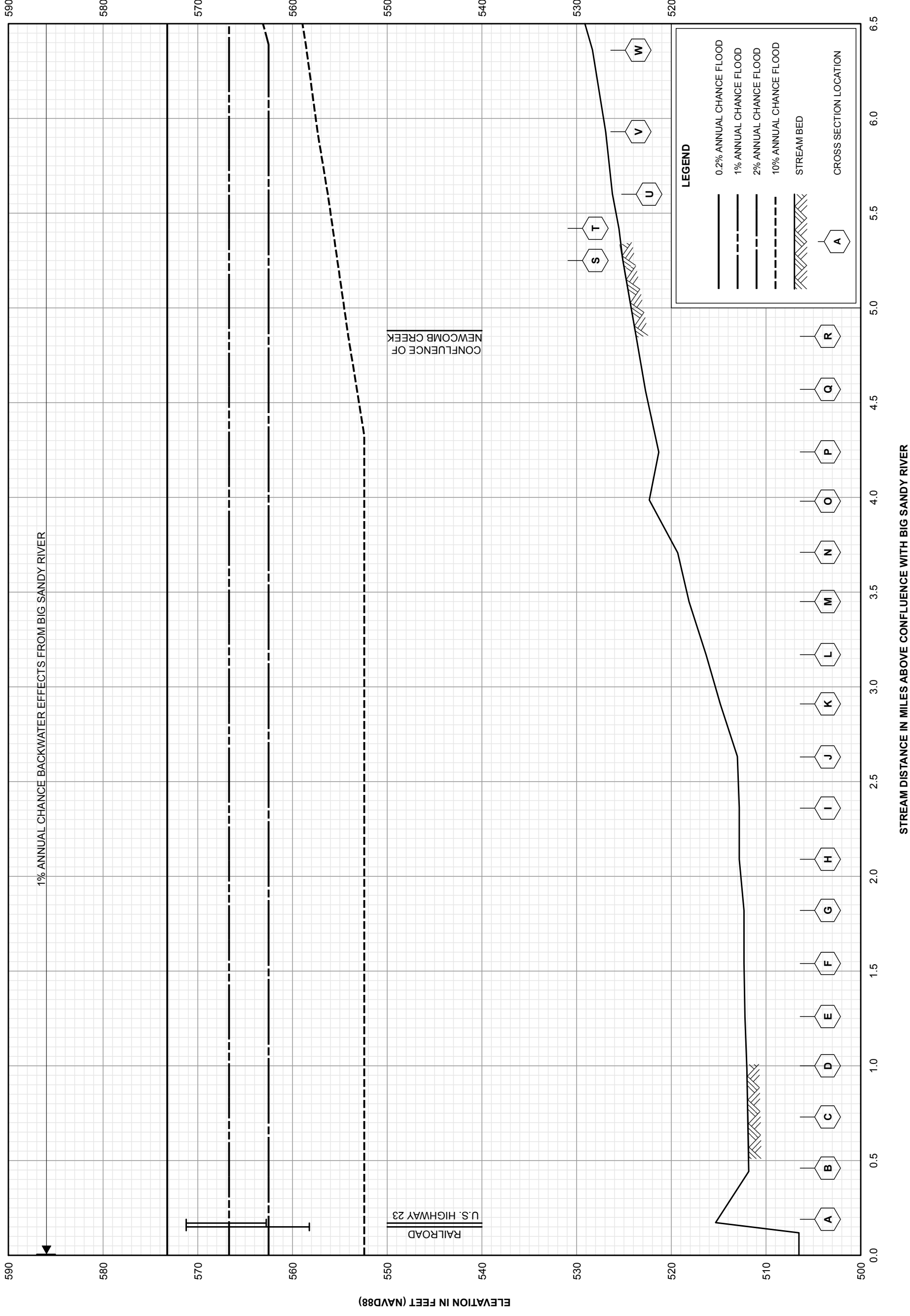
**TABLE 4**

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

**LAWRENCE COUNTY, KY  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**BLAINE CREEK**



**Attachment C**

**FEMA Preliminary FIS Information**

# FLOOD INSURANCE STUDY

## FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



## LAWRENCE COUNTY, KENTUCKY AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BLAINE, CITY OF	210458
LAWRENCE COUNTY UNINCORPORATED AREAS	210258
LOUISA, CITY OF	210241



# FEMA

**EFFECTIVE: PRELIMINARY June 13, 2014**

FLOOD INSURANCE STUDY NUMBER  
21127CV000B

Version Number 2.3.2.2

**Table 10: Summary of Discharges**

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Big Sandy River	At confluence with Ohio River	4,290	86,200	*	124,300	143,200	191,000
Big Sandy River	At River Mile 26.12 (Gage near City of Louisa, Kentucky)	3,892	78,200	*	116,300	137,200	19,400
Big Sandy River	At River Mile 25.99	3,882	78,200	*	116,300	137,200	194,000
Big Sandy River	At confluence of Tug & Levisa Forks (Mile 26.84)	3,878	78,200	*	116,300	137,200	194,000
Big Sandy River	At River Mile 19.66 (just upstream of Blaine Creek)	3,900	76,000	*	104,900	118,700	152,600
Blaine Creek	At confluence with Big Sandy River	265	15,800	*	24,400	28,500	38,800
Blaine Creek	At Yatesville Gage (River Mile 14.44)	217	11,100	*	17,500	20,700	30,000
Blaine Creek	At River Mile 41.42	79.5	6,500	*	10,200	11,800	16,300
Blaine Creek	Just upstream of lower Laurel Creek	46.8	4,300	*	6,800	8,000	11,000
Left Fork Blaine Creek	At confluence with Blaine Creek	18.4	2,170	*	3,470	4,100	5,700
Left Fork Blaine Creek	Just upstream of Keaton Fork (Mile 2.12)	11.2	1,510	*	2,430	2,990	4,040
Levisa Fork	At confluence with Big Sandy River	2,320	47,400	*	65,600	74,400	98,600

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (NAVD)	WITHOUT FLOODWAY <sup>2</sup> (NAVD)	WITH FLOODWAY (NAVD)	INCREASE	
<b>BLAINE CREEK</b>									
A	0.190	227	4,781	6.0	566.7	548.8	549.6	0.8	
B	0.460	134	4,016	7.1	566.7	549.6	550.2	0.6	
C	0.730	150	4,242	6.7	566.7	549.9	550.6	0.7	
D	1.000	129	3,818	7.5	566.7	550.3	551.0	0.7	
E	1.260	147	4,231	6.7	566.7	551.0	551.7	0.7	
F	1.540	165	4,363	6.5	566.7	551.5	552.2	0.7	
G	1.820	246	4,238	6.7	566.7	552.6	553.5	0.3	
H	2.090	202	4,404	6.5	566.7	553.3	554.1	0.8	
I	2.360	177	4,875	5.8	566.7	554.7	555.5	0.8	
J	2.630	199	5,125	5.6	566.7	555.0	555.8	0.8	
K	2.910	184	5,020	5.7	566.7	555.6	556.3	0.7	
L	3.170	245	5,939	4.8	566.7	556.2	557.0	0.8	
M	3.450	158	4,076	7.0	566.7	556.5	557.2	0.7	
N	3.710	180	4,683	6.1	566.7	558.1	559.0	0.9	
O	3.980	301	5,840	4.9	566.7	558.6	559.5	0.9	
P	4.240	270	5,315	5.4	566.7	559.6	560.4	0.8	
Q	4.570	391	7,208	4.0	566.7	560.1	561.1	1.0	
R	4.850	260	6,105	4.7	566.7	560.6	561.4	0.8	
S	5.250	176	4,271	6.7	566.7	560.9	561.9	1.0	
T	5.420	142	3,610	7.9	566.7	561.1	561.9	0.8	
U	5.600	289	6,141	4.6	566.7	563.3	564.1	0.8	
V	5.930	228	4,942	5.8	566.7	564.0	564.9	0.9	
W	6.360	154	4,033	7.1	566.7	564.7	565.4	0.7	
X	6.540	200	4,189	6.8	566.7	565.3	566.1	0.8	
Y	6.860	249	5,136	5.5	567.3	567.3	568.1	0.8	

<sup>1</sup>Miles above confluence with Big Sandy River

<sup>2</sup>Elevations computed without considering backwater effects from Big Sandy River

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**LAWRENCE COUNTY, KY**  
 AND INCORPORATED AREAS

**FLOODWAY DATA**  
**BLAINE CREEK**

**TABLE 24**



**FLOOD PROFILES**  
**BLAINE CREEK**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
LAWRENCE COUNTY, KY  
AND INCORPORATED AREAS

