INITIAL DESIGN FLOOD CONTROL PLAN

40 CFR 257.82

Bottom Ash Pond Complex

Kanawha River Site

Glasgow, WV

May, 2026

Prepared for: Appalachian Power Company

Prepared by: American Electric Power Service Corporation

1 Riverside Plaza

Columbus, OH 43215

Kanawha River Plant

Bottom Ash Pond Complex

Initial Design Flood Control Plan

PREPARED BY Dan Murphy
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Dan Murphy, P.E.

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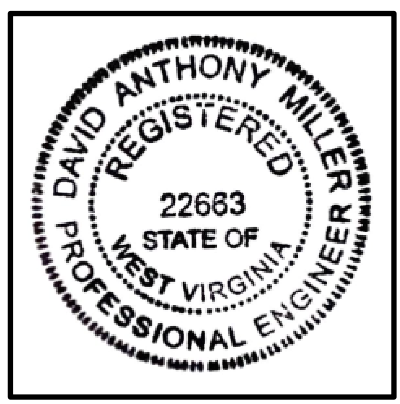
DATE ______________

Blake Arthur, P.E.

APPROVED BY David Anthony Miller DATE 04.23.2026

David Anthony Miller, P.E.

Director- Ash Management Services



I certify to the best of my knowledge, information, and belief that the information contained in this inflow design flood control plan meets the requirements of 40 CFR § 257.82

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1.0 OBJECTIVE

The "Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Legacy CCR Surface Impoundments", 89 Fed. Reg. 38950 (May 8, 2024) (amending 40 C.F.R. §257) requires owners and operators of facilities with a legacy coal combustion residual (CCR) surface impoundment to prepare an initial inflow design flood control plan for each legacy CCR surface impoundment at the facility.

The Bottom Ash Pond Complex at the Kanawha River Site is subjected to this rule.

2.0 DESCRIPTION OF THE CCR UNIT

The Kanawha River Site is located approximately 0.5 miles southeast of Glasgow, West Virginia. The latitude/longitude of the Bottom Ash Pond Complex is: 38° 12' 33.34"N / 81° 25' 25.52"W. Construction of the Kanawha River Plant began in October of 1950 and the plant reached commercial operation in August of 1953. The Kanawha River Plant ceased operating in May 2015.

The BAP consists of the North Bottom Ash Pond, the South Bottom Ash Ponds, and the Clearwater Pond. The site is bounded by the Kanawha River on the west, the town of Glasgow on the North, and the railroad on the east.

The BAP is generally an incised surface impoundment with only the west portion of the Clearwater Pond contained by an 8-foot-tall dike built up above original grade. The water level of the Clearwater Pond is operated and maintained below the exterior toe. The exterior slope of the western Clearwater Pond dike is 2 Horizontal to 1 Vertical (2H: 1V) with interior slopes of 2.5H: 1V. The remainder of the pond complex is incised, with a surrounding ground elevation of 623 ft-msl. This grading scheme is a function of the powerplant grades being elevated for flood protection to elevation 623 ft-msl and the BAP area being a main borrow area, and the proximity of the western property line to the Clearwater Pond.

The BAP discharges through a concrete riser in the northwest corner of the Clearwater Pond (Outfall 001) that ties into a stormwater sewer which flows under the BAP.

<u>3.0</u> INFLOW DESIGN FLOOD CONTROL PLAN 40 CFR § 257.82

The Initial inflow design flood control plan was prepared by WSP USA Inc. and excerpts from that document are included as Attachment A.

The results of the inflow flood routing calculations demonstrate that the Kammer Ash Pond cannot adequately manage flow into and out of the CCR unit during the design flood. AEP is evaluating alternatives for flood control mitigations to address the deficiency.

ATTACHMENT A

Initial Inflow Design Flood Control Plan

REPORT

Hazard Potential Classification Assessment and Inflow Design System Flood Control Plan

Bottom Ash Pond, Former Kanawha River Power Plant, Glasgow, West Virginia

Submitted to:

Mr. Murphy

American Electric Power Company, Inc.
Project Manager
1 Riverside Plaza,
Columbus, OH 43215

Submitted by:

WSP USA Inc.

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US0041868.3860

April 3, 2026

Distribution List

Benjamin J Hackett (bjhackett@aep.com)

Jane Petrie (jpetrie@aep.com)

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BAP Complex Historical Drawings

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CERTIFICATION

Professional Engineer Certification Statement [40 CFR §257.73(a) and 40 CFR §257.82(c)].

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Section §257.73 and Section §257.82 (40 CFR Part §257.73(a) and 40 CFR §257.82), I attest that this Hazard Potential Classification Assessment and Inflow Design Flood Control System Plan is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part §257.73(a) and 40 CFR §257.82.

WSP USA Inc.

Signature

April 3, 2026

Date of Report Certification

Steven J. Moeller, PE (AL, GA, NC, SC, TN, WV)

Name

27354

Professional Engineering Certification Number

1 INTRODUCTION

WSP USA Inc. (WSP) was retained by Appalachian Power Company, a subsidiary of American Electric Power Company, Inc. (AEP), to complete a Hazard Potential Classification Assessment, including a dam breach analysis, and prepare an Inflow Design Flood Control System Plan (Report) for the Bottom Ash Pond (BAP) complex, an inactive Coal Combustion Residuals (CCR) surface impoundment, located at the former Kanawha River Power Plant (Plant), Glasgow, WV. The site location is shown in Figure 1. The purpose of this Report is to provide a basis for the certification required by 40 Code of Federal Regulations (CFR) §257.73(a) Hazard Potential Classification Assessment and 40 CFR §257.82 Hydrologic and Hydraulic Capacity Requirements for CCR Surface Impoundments.

Section 40 CFR §257.73(a)2 requires the owner or operator of a CCR surface impoundment to conduct a hazard potential classification assessment of the CCR unit. The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

Section 40 CFR §257.82(a) requires the owner or operator of a CCR surface impoundment to design, construct, operate, and maintain an inflow flood control system as follows:

- Adequately manage the flow into the CCR unit during and following the peak discharge of the inflow design flood as required by the CCR unit hazard potential determined under 40 CFR §257.82(a)(3).
- Adequately manage the flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood as required by the CCR unit hazard potential determined under 40 CFR §257.82(a)(3).
- Handle discharge from the CCR unit in accordance with the surface water requirements under 40 CFR §257.3-3, which requires that:
  - a facility shall not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES) under section 402 of the Clean Water Act, as amended.
  - a facility shall not cause a discharge of dredged material or fill material to waters of the United States that is in violation of the requirements under section 404 of the Clean Water Act, as amended.
  - a facility or practice shall not cause non-point source pollution of waters of the United States that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been approved by the Administrator under section 208 of the Clean Water Act, as amended.

Analyses completed for the hazard potential classification and hydrologic and hydraulic (H&H) assessment of the BAP complex are described in this Report. The data and analyses provided in the following sections are based on BAP complex design information obtained from historical drawings (included in APPENDIX A) and topographic survey information from the U.S. Geological Survey (USGS) National Map 3D Elevation Program (3DEP) 1-Meter Resolution DEM (USGS 1 Meter, 2018). Site features and topography are included in Figure 2. The analysis approach and results of the H&H analyses presented in the following sections were used to evaluate the capacity requirements of the BAP complex based on the requirements included in 40 CFR. §257.82.

2 BACKGROUND

The former Kanawha Power Station utilized multiple surface impoundments, the East Fly Ash (EFA) Pond and the Bottom Ash Pond (BAP) complex, to manage sluiced ash from the facility during its operating life. This Report evaluates the capacity requirements of the BAP complex based on the inflow design flood. The BAP complex is located west of the former Plant and is classified as a legacy CCR impoundment under the United States Environmental Protection Agency's (USEPA) Legacy CCR Final Rule (May 28, 2024), which established regulatory requirements for legacy CCR surface impoundments and CCR management units.

The Kanawha River Site is located approximately 0.5 miles southeast of Glasgow, West Virginia. Construction of the Kanawha River Plant began in October 1950, and the plant reached commercial operation in August 1953. The Kanawha River Plant ceased operating in May 2015. The BAP complex consists of the North BAP, the South BAP, and the Clearwater Pond. The site covers approximately 8 acres and is bounded by the Kanawha River on the west, the town of Glasgow on the North, and the railroad on the east.

The BAP complex is generally an incised surface impoundment with only the west portion of the Clearwater Pond contained by an approximate 7-foot-tall dike built up above original grade. The water level of the Clearwater Pond is operated and maintained below the downstream toe of the dike. The exterior slope of the western Clearwater Pond dike is approximately 2 Horizontal to 1 Vertical (2H: 1V). The remainder of the pond complex is incised, with a surrounding ground elevation of 623 feet mean sea level (MSL). The ponds are predominantly incised as the powerplant grades were elevated for flood protection to an elevation of 623 feet MSL, and the BAP area was used as a borrow source. The diked portion of the Clearwater Pond was constructed due to its proximity to the western property line.

The BAP complex discharges through concrete risers located within the Clearwater Pond and the North BAP that convey water to the South BAP riser structure, which discharges through a 36-inch concrete pipe at Outfall 001 into the Kanawha River. Figure 2 shows the hydraulic features associated with the BAP complex.

3 HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

WSP conducted a breach analysis of the BAP complex according to the requirements of 40 CFR §257.73(a) using the 2-dimensional (2D) routines in the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center's River Analysis System (HEC-RAS) Version 6.6 computer modeling program. The breach model includes the combined Clearwater Pond, North BAP, and South BAP with the most recent LiDAR obtained from the United States Geological Survey (USGS) National Map. A summary of the model inputs, calculations, and results is included in APPENDIX B. Figure 3 depicts the potential area of inundation in the event of a sunny-day, catastrophic failure of the BAP complex.

As shown in Figure 3, 118 potential properties with hazard impacts are located within the breach inundation zone. The residential building with the greatest potential for flooding may experience a flood depth up to 3.5 feet. Refer to APPENDIX B, which lists the potential flooding at all structures within the breach inundation zone. Due to the large number of potentially impacted structures and a peak flooding depth at a residential structure exceeding 2 feet, it is concluded that a failure of the BAP complex would likely result in a probable loss of human life. The BAP complex, therefore, meets the definition of a high-hazard potential CCR surface impoundment in accordance with the CCR Rule.

4 INFLOW DESIGN FLOOD CONTROL SYSTEM

In accordance with 40 CFR §257.82(a), the inflow design flood control system must be capable of adequately managing the flows into the CCR unit during and following the peak discharge of the inflow design flood, as well as managing the flows from the CCR unit to collect and control the peak discharge resulting from the inflow design flood. The following sections describe the flood control systems in place, present the analysis performed to evaluate the adequacy of the existing structures, and list any operational limitations required to maintain adequate flood control measures as required by 40 CFR §257.82(a).

4.1 Existing Flood Control Infrastructure

The BAP complex receives offsite runoff from the area northeast of the railroad tracks through two culvert pipes that collect water running off the upgradient hillside and convey the water beneath the railroad tracks into the concrete riser structures for the Clearwater Pond (Culvert 5) and the North BAP (Culvert 4) (see Figure 2). This water is conveyed through the ponds' outlet structures to the outlet structure for the South BAP (Manhole 3), where it is discharged through a 36-inch diameter concrete outlet pipe to the Kanawha River.

In addition, inflows to the system include precipitation falling directly into and around the ponds, as well as additional sources (such as sump pumps and drains) routed from the former facility area to the BAP complex. The Clearwater Pond, North BAP, and South BAP are hydraulically connected, and the water levels within these impoundments will seek equilibrium when the water surface elevation exceeds the invert elevation of the riser structures.

Outflow from each pond gravity drains through a concrete riser structure. The riser structure in the Clearwater Pond (Manhole 1) consists of a V-notch weir, while the riser structure (Manhole 2) in the North BAP consists of an open-top weir. The structures in the Clearwater Pond and North BAP discharge through gravity drainage pipes, which subsequently converge into a single pipe at Manhole 3 located within the South BAP. From Manhole 3, the outfall from the pond flows via gravity to the Kanawha River and discharges at Outfall 001.

4.2 Capacity Criteria

Flood control infrastructure must adequately manage flow entering the CCR unit during and following the design flood specified by the impoundment hazard potential classification. For the BAP complex, a high hazard potential classification assessment triggers the use of the Probable Maximum Precipitation (PMP) event in the inflow design flood control system plan under 40 CFR §257.82. Additionally, the CCR Unit must adequately manage flows exiting the impoundment during and following the design storm. This requirement is interpreted as the prevention of embankment overtopping, while maintaining appropriate freeboard, during the design storm.

5 HYDROLOGIC ANALYSES

WSP completed this H&H assessment of the BAP complex during a PMP event under 40 CFR §257.73. The analyses determine the precipitation inputs, watershed characteristics, runoff volumes, and inflow hydrographs used to assess the adequacy of the existing flood control system under the applicable design storm conditions.

5.1 Precipitation & Inflow Sources

The design storm rainfall depth was obtained from the USACE Hydrometeorological Report No. 51 (HMR-51) – *Probable Maximum Precipitation Estimates, United States East of the 105th Meridian*. The PMP for the 6-hour duration storm is 27.9 inches. The Natural Resources Conservation Service (NRCS) 6-hour storm distribution was applied to the PMP event.

Inflow sources to the BAP complex considered in the hydrologic analyses only include stormwater runoff from the upgradient drainage area northeast of the railroad that drains into the impoundments. Other potential inflow sources, including rainfall directly into the BAP complex, were conservatively ignored in the analysis, as the inflow design flood from this large drainage area during a PMP event is significantly greater than these other inflows.

5.2 Watershed Delineation

The drainage areas contributing runoff to the BAP complex were delineated using ESRI ArcGIS Pro based on topographic data derived from the USGS West Virginia Statewide 2018 LiDAR dataset. Two primary drainage basins, northeast of the railroad, contributing flow to the BAP complex were identified: the North subbasin and the South subbasin, as shown on Figure 2. The contributing drainage areas for the North and South subbasins are 166 acres and 76 acres, respectively. Other flows into the BAP complex were ignored as the associated runoff volumes are insignificant compared to the runoff generated from this upgradient hillside during the inflow design flood event.

An overall Soil Conservation Service (SCS) curve number for the contributing drainage areas was developed based on the National Engineering Handbook (NEH) Part 630, Chapter 9, which provides a breakdown of curve numbers for each soil type and land use combination. Soil data were obtained from the NRCS online soils database, and land use areas were delineated based on aerial imagery. The curve number (CN) is a measure of runoff potential and is based on the percent impervious and land use characteristics within the watershed area. These values are published by the Multi-Resolution Land Characteristics Consortium as part of their National Land Cover Database (NLCD). Refer to APPENDIX B for a comprehensive description of the watershed hydrology and parameter development. The CN for antecedent runoff condition II (ARC-II) was chosen based on the recommended CNs given in Tables 9-1, 9-2, and 9-5 of the NEH Part 630. A CN of 65 and 66 was selected for the North and South drainage basin areas, respectively.

5.3 Runoff Volume Analyses

The BAP complex system was modeled by importing the information provided in the preceding sections into a hydrologic model developed using the Autodesk Storm and Sanitary Analysis (SSA), Version 2022. A detailed memorandum outlining the runoff volume analysis of the stormwater system is provided in APPENDIX C. The total runoff volumes for the North and South subbasins are 309.4 acre-feet and 144.0 acre-feet, respectively, with the total inflow volume of 453.4 acre-feet from the two subbasins. The inflow hydrographs for the North and South subbasins are presented in Chart 1.

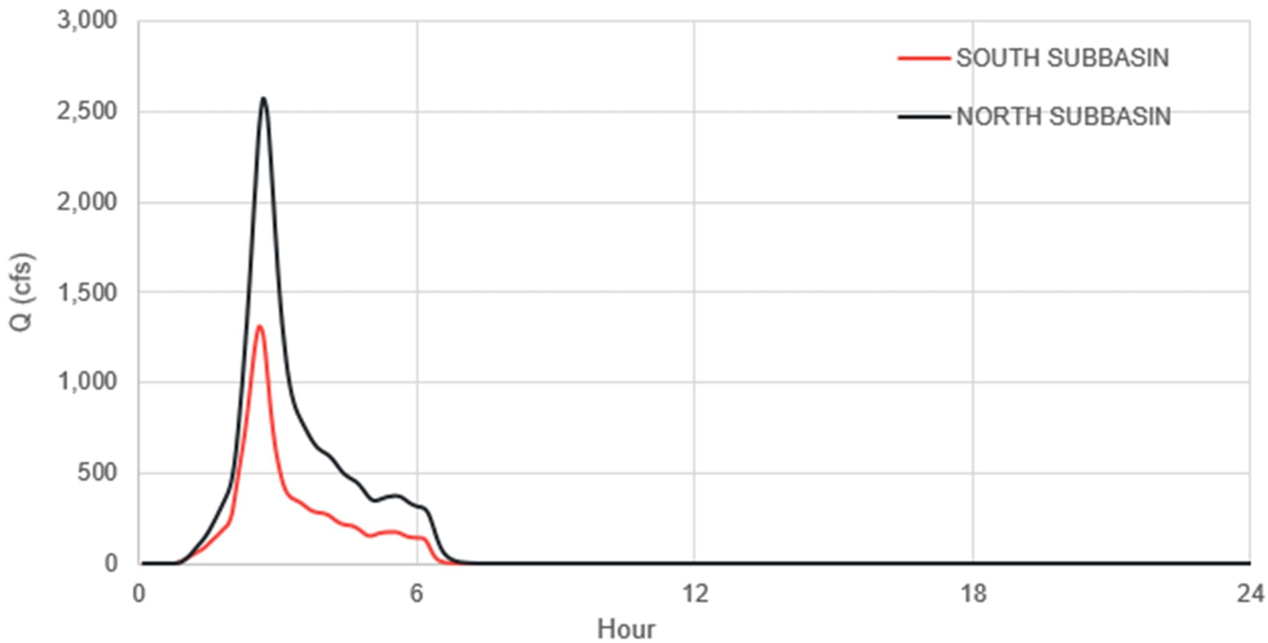


Chart 1: Inflow Hydrograph for the North and South Subbasins

Stormwater runoff from the two subbasins during the PMP event upstream of the railroad tracks results in a peak inflow rate into the BAP complex of approximately 3,800 cubic feet per second and a total inflow volume of approximately 453 acre-feet.

5.4 Stage Storage Curves

WSP developed the reservoir stage-storage relationship using topography derived from the USGS West Virginia Statewide 2018 LiDAR dataset. The reservoir areas were extrapolated beneath the water level, assuming a pond bottom elevation of 602.0 feet and side slopes of approximately 3 horizontal to 1 vertical (3H:1V) side slope as indicated in the historical drawings. Chart 2 provides the combined staged-storage curve for the combined BAP complex. Individual staged-storage curves for each impoundment within the BAP complex are provided in APPENDIX C .

As shown in Chart 2, the total combined staged storage for the BAP complex is 73.5 acre-feet at elevation 623 feet MSL.

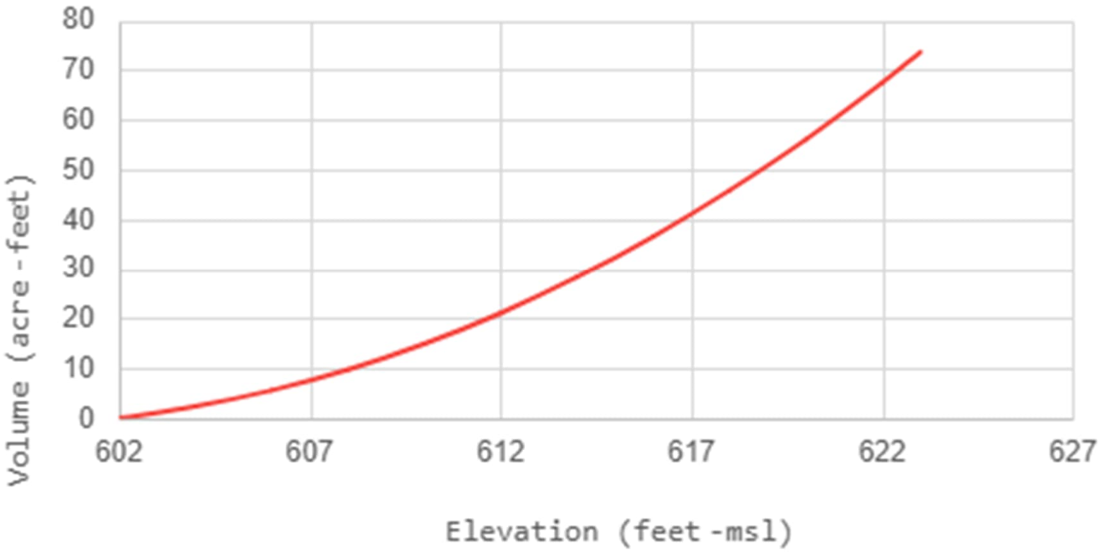


Chart 2: Combined Stage Storage Curve for the BAP Complex

5.5 Inflows and Outflows During Design Storm Event

The total available storage volume for the BAP complex is less than the reservoir capacity required to contain the inflow design flood during the PMP event. This assessment assumes that all runoff from the North and South subbasins that is not routed through the 36-inch diameter outlet pipe to the Kanawha River will flow into the impoundments. However, as the two culverts beneath the railroad tracks are insufficient to convey water to the BAP complex during a PMP event, the stormwater inflows from the North and South subbasins would overtop the railroad and partially flow into the ponds.

To evaluate the extent of flow into the BAP complex, WSP routed runoff from the North and South subbasins during the PMP 6-hour event using the HEC-RAS program, Version 6.6. The downstream boundary condition was set to the 100-year flood elevation of 610 feet MSL in the Kanawha River. The analysis considered overland flow routing based on existing topography and did not incorporate the conveyance structures. Image 1 below illustrates the resulting inundation extent and flow directions during the PMP 6-hour event.

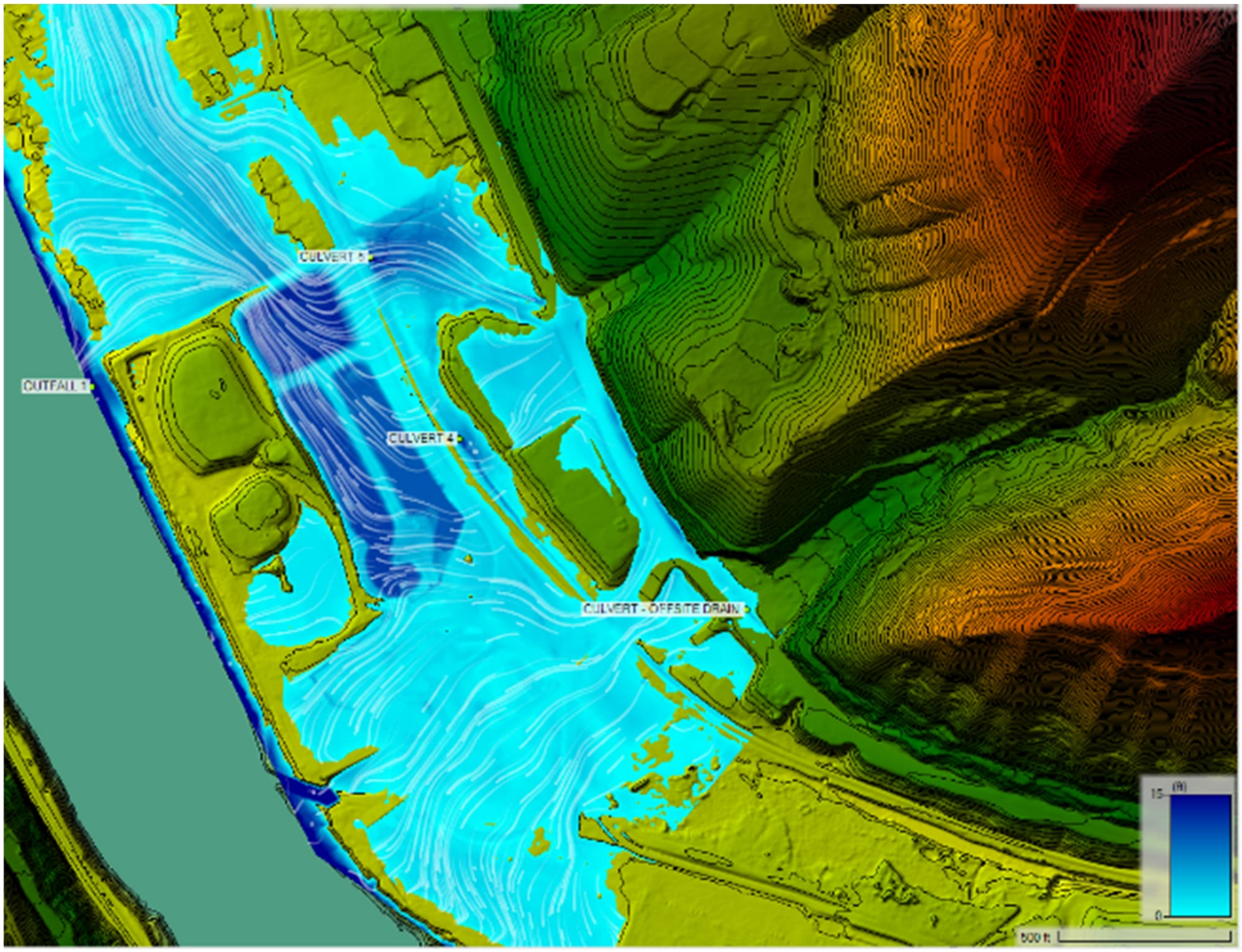


Image 1: Inundation Extents and Flow Direction during the PMP 6-hour Event

From this analysis, WSP estimates that approximately 313 acre-feet of inflow would be conveyed from the North and South subbasins into the BAP complex at a maximum flow rate of approximately 2,760 cubic feet per second.

6 SUMMARY

WSP conducted a Hazard Potential Classification Assessment and prepared an Inflow Design Flood Control System Plan for the BAP complex in accordance with the requirements of 40 CFR §257.73(a) and 40 CFR §257.82. The assessment included a dam breach analysis to evaluate downstream consequences associated with a hypothetical failure of the impoundment system, as well as H&H analyses to evaluate the adequacy of the existing flood control infrastructure under the applicable inflow design flood conditions.

The dam breach analysis indicates that a failure of the BAP complex would result in inundation of numerous downstream properties with peak flood depths at residential structures exceeding 2 feet, which would result in a probable loss of human life. Based on these findings, the BAP complex meets the definition of a high hazard potential CCR surface impoundment under the CCR Rule.

Based on site observations, review of available information, and the H&H analyses described herein (including associated calculations provided in APPENDIX C), the subject ponds in the BAP complex have flood control systems that are not adequate to manage flow into and from the units under the applicable inflow design flood.

Hydrologic analyses performed using the PMP event demonstrate that routing runoff from the North and South subbasins will direct approximately 313 acre-feet of stormwater into the BAP complex over an approximate 5-hour period. This inflow into the BAP complex far exceeds the existing capacity of the complex, which is approximately 73 acre-feet.

Although conveyance limitations beneath the railroad tracks reduce the total volume of runoff entering the impoundments through these conveyance pipes, routing analyses indicate that the outflows from the North and South subbasins would overtop the railroad during the design storm and flow into the BAP complex, exceeding the available stage-storage capacity. As a result, the BAP complex would overtop and convey stormwater into the adjacent neighborhood located north of the BAP complex. The CCR unit cannot adequately manage flow following the peak discharge of the inflow design flood as required by the CCR Rule.

WSP recommends evaluating alternative flood control measures, such as bypassing the flow from the North and South subbasins or modifying the outlet works from the BAP complex. Modifying the outlet works could include adding additional conveyance piping or the addition of alternative spillway capacity (e.g., an open-channel spillway), to provide sufficient discharge capacity and convey flow from the BAP complex to the Kanawha River in accordance with applicable CCR Rule requirements.

7 REFERENCES

USEPA, 2015. 40 CFR Parts §257, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. April 17, 2015.

Schreiner, L. C., & Riedel, J. T. (1978). Hydrometeorological Report No. 51: Probable Maximum Precipitation Estimates, United States East of the 105th Meridian. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and U.S. Department of the Army, Corps of Engineers.

US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), National Engineering Handbook Part 630 Hydrology.

U.S. Geological Survey, 20231201, USGS 1 Meter 17 x46y423 WV_FEMAR3_Southcentral_2018_D19.

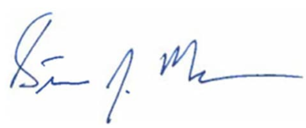
Signature Page

WSP is pleased to have provided this Hazard Potential Classification Assessment and Inflow Design Flood Control System Plan for the Bottom Ash Pond at the former Kanawha River Power Plant. Any questions concerning this document should be directed to the undersigned.

WSP USA Inc.

Yong Cheng Soo, PE (GA, SC)
Senior Consultant, Water Resources Engineer

Naveen Kumar Ganji, PE (GA, TN, TX, VA)
Senior Consultant, Geotechncial Engineer



Steven J. Moeller, PE (AL, GA, NC, SC, TN, WV)
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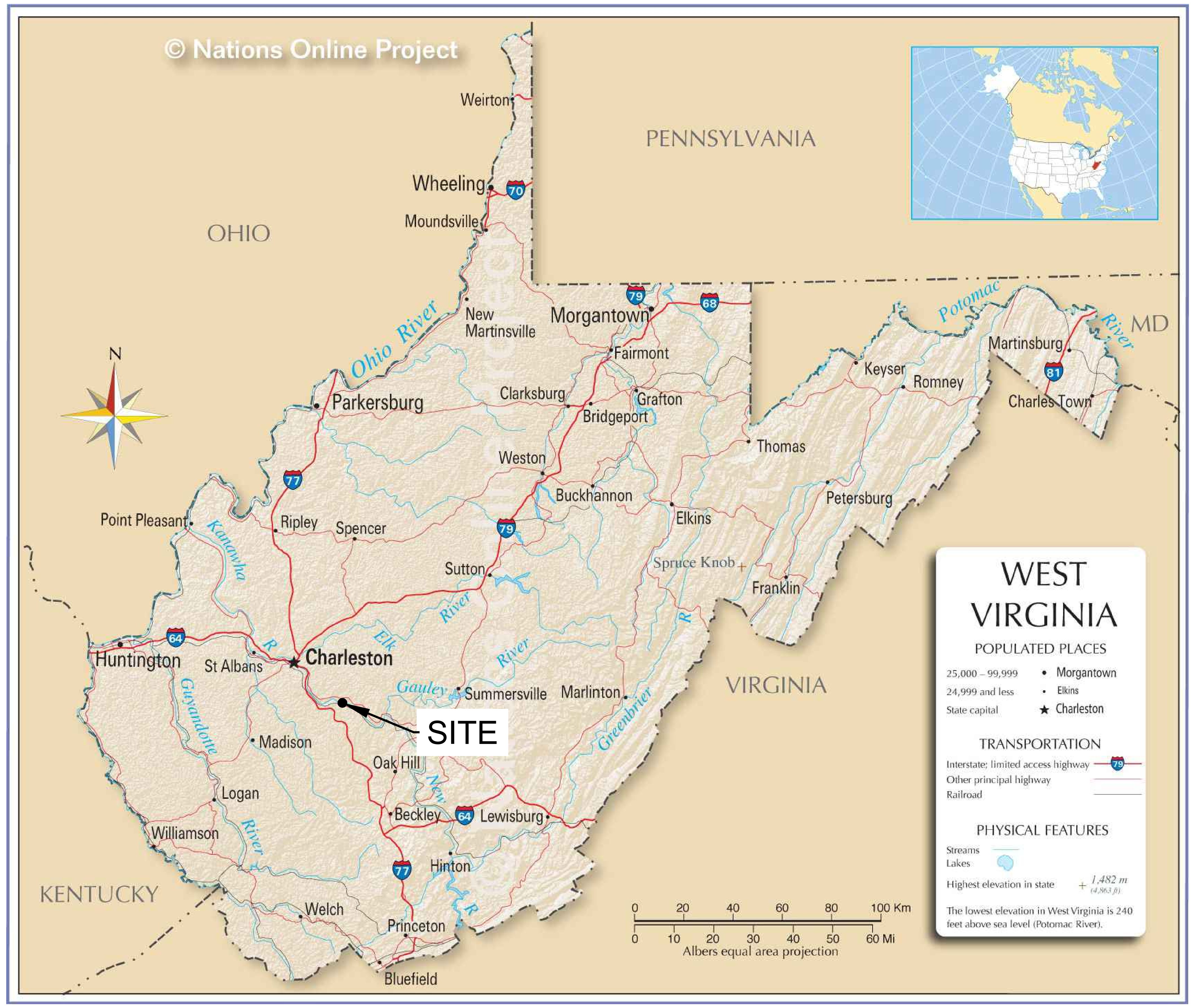
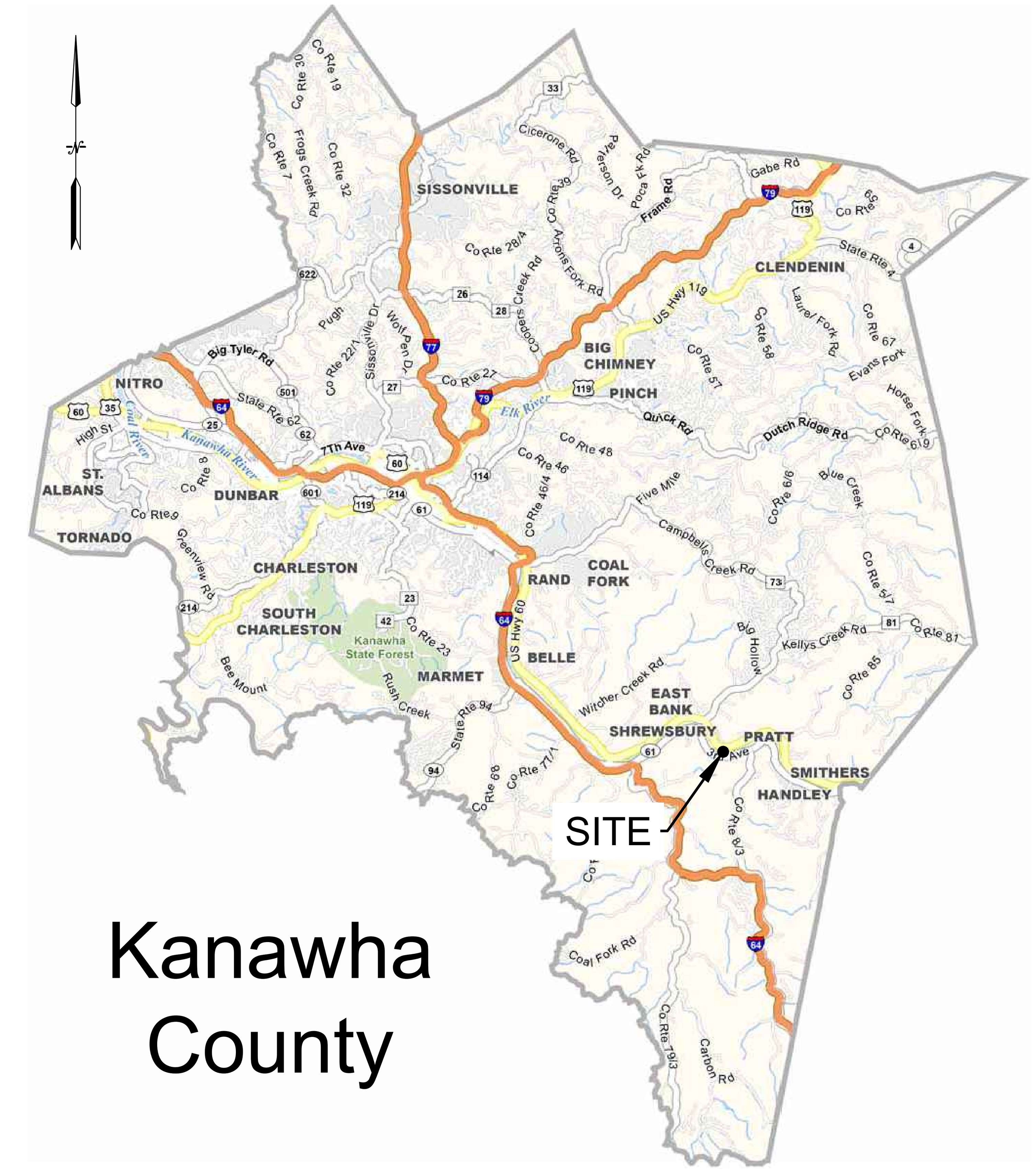
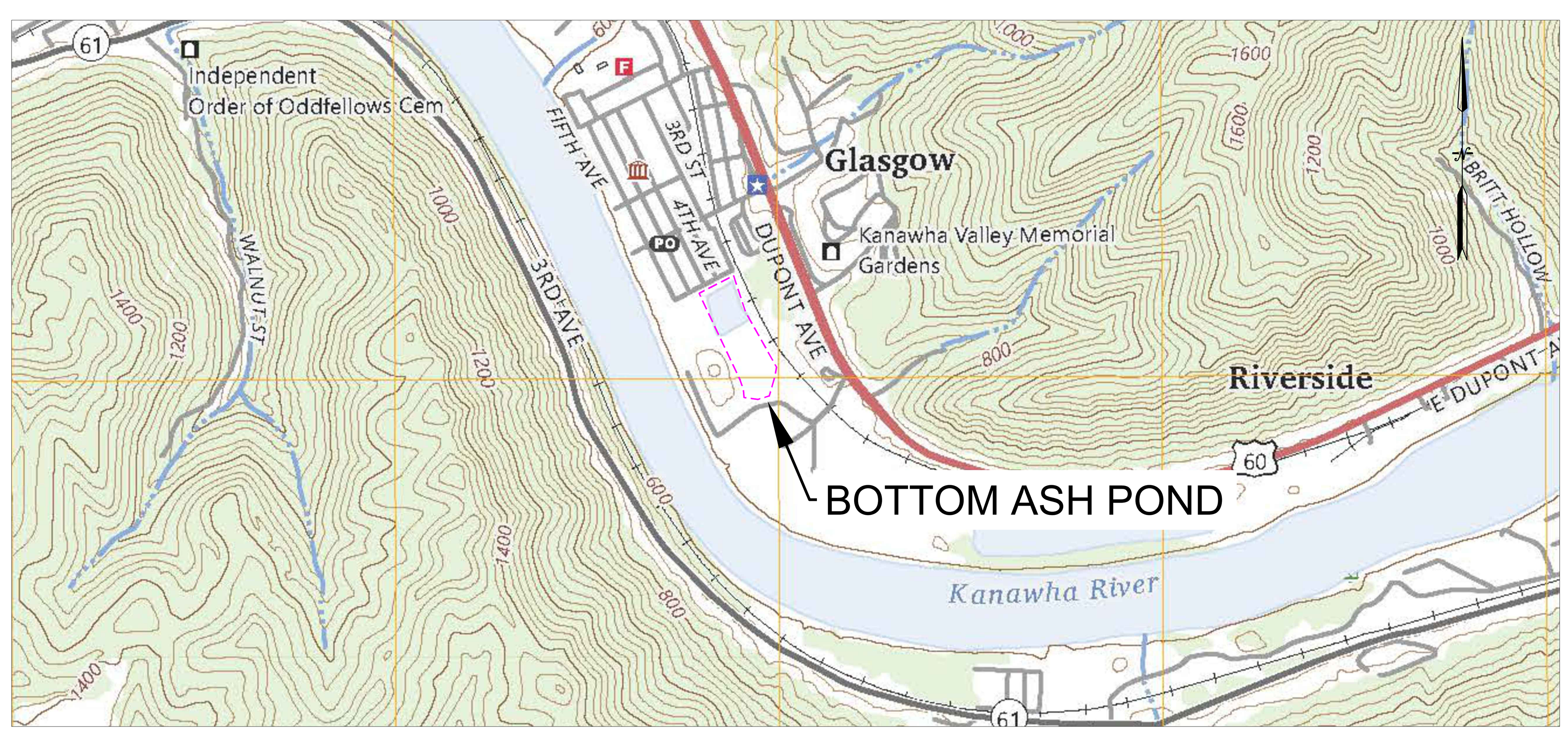
Figures







1000 0 1000 2000 FT

REFERENCES:
USGS 7.5 MINUTE QUADRANGLE; CEDAR GROVE, 2023.

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

THIS DRAWING IS CLASSIFIED AS:

REFERENCE AEP's CORPORATE INFORMATION SECURITY POLICY

APPALACHIAN POWER COMPANY

BOTTOM ASH POND
FORMER KANAWHA RIVER POWER PLANT

GLASGOW WEST VIRGINIA

SITE LOCATION PLAN

UNIT: FEET | DRAWING NUMBER: 1 OF 2 | REV: –

SCALE:
DR: CCP
CH: NG
SUP: NG
ENG: SJM
DATE: 01/05/2026

APPROVED BY

STEVEN J. MOELLER REGISTERED 27354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

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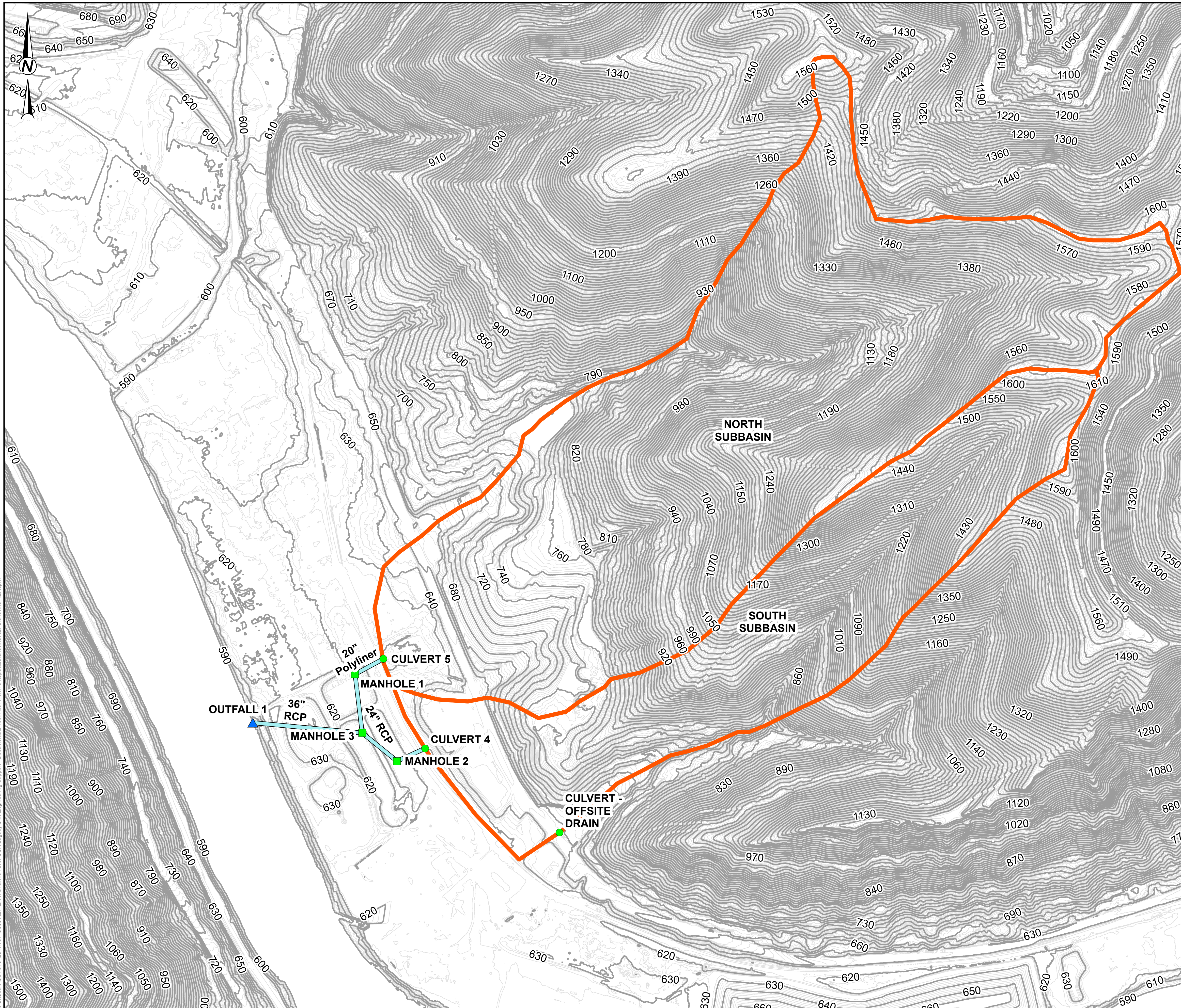
Suite 1100
Atlanta, GA 30326

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215



LEGEND

- CULVERT
- OUTFALL
- RISER
- SUBBASIN

REFERENCE

1. MAPPING IS BASED ON ELEVATION PRODUCT: U.S. GEOLOGICAL SURVEY, 2018.

0 600 1,200

1 IN= 600 FT

CLIENT
APPALACHIAN POWER COMPANY
FORMER KANAWHA RIVER POWER PLANT

PROJECT
BOTTOM ASH POND COMPLEX

TITLE
BAP COMPLEX SITE CONDITIONS PLAN AND DRAINAGE BASINS

CONSULTANT

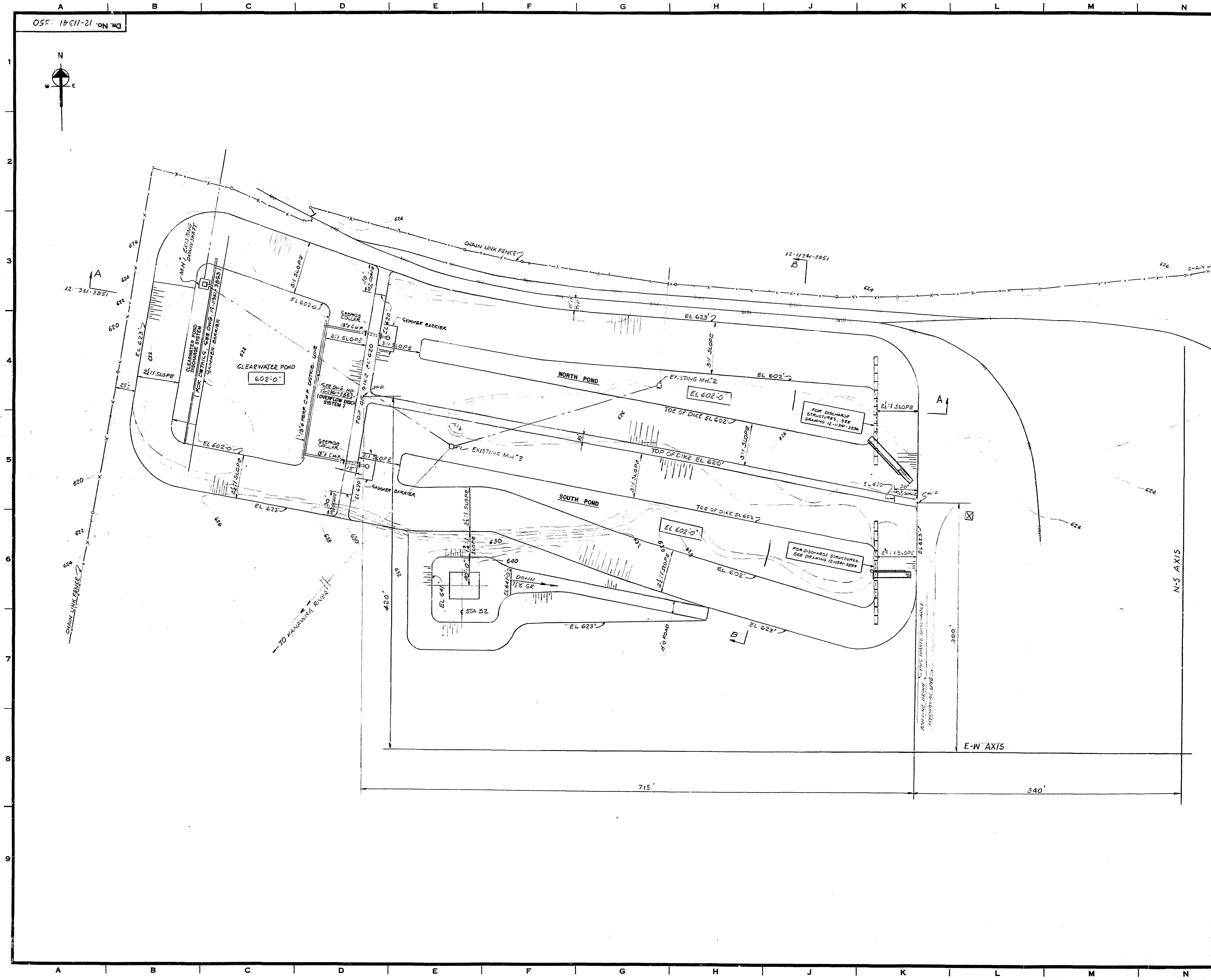
YYYY-MM-DD	2026-03-04
PREPARED	YCS
DESIGN	YCS
CHECKED	XXX
REVIEWED/APPROVED	SJM

PROJECT No. US0041868.3860 | Rev. 0 | FIGURE 2

APPENDIX A

BAP Complex Historical Drawings


DR. NO. S-3344-3007
TYPICAL PLAN OF MANHOLES 1 & 2
PLANT NORTH
HEADWALL #3
SECTION F-F & F1-F1
SCALE 1" = 20'-0"
FOR DETAILS SEE DWG S-3344-3358
SEE REV. 2 & 3. DWG 3358
MANHOLE-SHAFT No 1 EAST FACE
Section b-b (DRAINSHAFT) MH-5
MANHOLES
PLACING OF DRAIN PIPE IN ASH YARD
MH #1 (new drainshaft) to be Altered as per Dwg 3358-C
CINDER DISPOSAL AREA EL 593
CAPACITY TO EL 623 - 265,000 CU YD
FINISHED GRADE EL 623
PLANT EXCAVATION SEE DWG 3005
GRADE EL 623
GRADE EL 625
MATCH LINE
Present Baseline
NORMAL POOL EL 590
HEADWALL #2
HEADWALL #1
Donot remove Trees from River bank except where cut is required
Earth work and Drains by Boso & Ritchie inc.
EXCAVATION
CINDER AREA 162,000 cu yd
CUT AREAS TO EL 623 66,000
CUT RIVER BANK FOR COAL-DOCK 9,000
PLANT EXCAVATION 1st STEP 157,000
PLANT EXCAVATION 2nd STEP 43,000
TOTAL CUT 437,000 cu yd
FILL
FILL AREAS TO EL 623 GRADE 265000 (plant exc area not included)
FILL AREA TO EL 625 GRADE 169000
PLANT BACK FIL (TO EL 623) 105000
TOTAL FIL 539,000 cu yd
NOTE
The above quantities are for the area West of Match-line. Quantities of Earthwork East of Match-line are shown on Drawing S-3344-3356 which shows cut & Fill work for the Fly-Ash yard
The amount of cut will ballance the amount of Fill by adding the quantities shown on this drawing and drawing S-3344-3356
Max Flood level El 623.7
Normal Pool El 590.0
Lowwater El 575.6
Protected to El 630.0
Section thru headwall #2
SECTION A-A
SECTION B-B
SECTION M-M
SECTION L-L TYPICAL
SECTION D-D TYPICAL THRU RIVER
SECTION E-E
SECTION K-K
ELEVATION H-H
SCALE 1" = 50'-0"
Location of Borings (See Boring Plan Dwg 3004)
Present Contours
Excav. & Grading Contours
DRAINSHAFT & MANHOLES DWG S-3344-3357
PLANT EXCAVATION FIRST STEP SEE DWG S-3344-3005
BORING DATA DWG S-3344-3003
BORING LOCATION PLAN S-3344-3004
Rev.
4/20/51 10 Headwall 3 Revised Grading to El 625 added GR
5/22/51 11 Quantities of Earth handling revised Earth work in coal Area, SECTION HH added Slope of cut cinder yard changed to 3:1 #2:1 GR
9/7/51 12 Cut of River bank W. of Plant (at coal dock) Located Sections K, L & M added GR
12/17/53 13 Opening in MH-1 added for Cinder drainage GR
3/30/54 14 MH-1 Altered as per Dwg 3358-3 GR
9/28/50 1 Revised Drains
2 Plant North changed revised Drains and Note re. Topsoil added. Borings shown, Concrete Details for Manholes and Headwalls for Drains added
3 Dimensions Changed
4 12'-0" Dike South of plant excavation continued as Road
5 Dimensions Changed
6 EXTENDED 12'-0" DIKE SOUTH OF PLANT EXCAVATION
7 PLANT MOVED 7'-10" NORTH
8 Dim. 320.0 added
9 Added Field Information
DATE NO. DESCRIPTION APPD.
REVISIONS
AMERICAN GAS & ELECTRIC SERVICE CORPORATION
30 CHURCH STREET NEW YORK
EXCAVATION & GRADING PLAN
APPALACHIAN ELECTRIC POWER CO.
KANAWHA RIVER PLANT
GLASGOW, WEST VIRGINIA
SCALE
DATE
ARCH. CH.
ELEC. CH.
MECH. CH.
STRUC. CH.
DR. BY
TR. BY
CH. BY
APPROVED
DR. No. S-3344-3007
Rev. 14



GENERAL NOTES

PERMANEABILITY OF THE BOTTOM ASH IS 5×10^{-3} CM/SEC.

REFERENCE DWGS

EXCAVATION & GRADING PLAN - S-3344-3807
CINDER YARD DR. STRUCTURES - S-3344-3368
BOT ASH STGE AREA - SECTS - S-3344-3851
FOR ADDITIONAL REF DWGS SEE 12-11341-3851
12-11341-3852 - OVERFLOW STRUCTURE & SUPPORTS FOR DISTRIBUTION LINE
12-11341-3853 - TROUGH SUPPORTS FOR OVERFLOW STRUCTURE

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

APPALACHIAN POWER CO.
KANAWHA RIVER PLANT
GLASGOW WEST VA.

BOTTOM ASH STORAGE AREA MODIFICATION

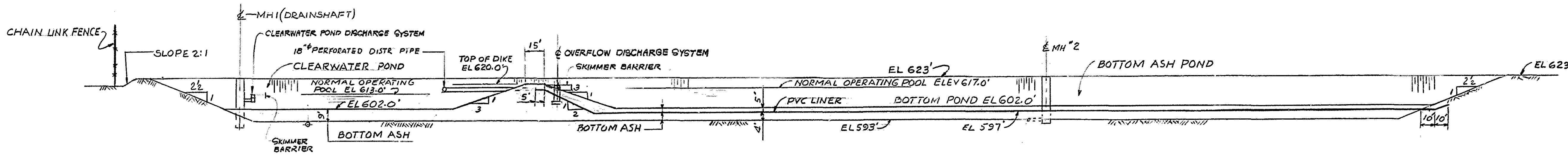
DR. NO. 12-11341-3850

ARCH.		ELEC		MECH.		STR.	

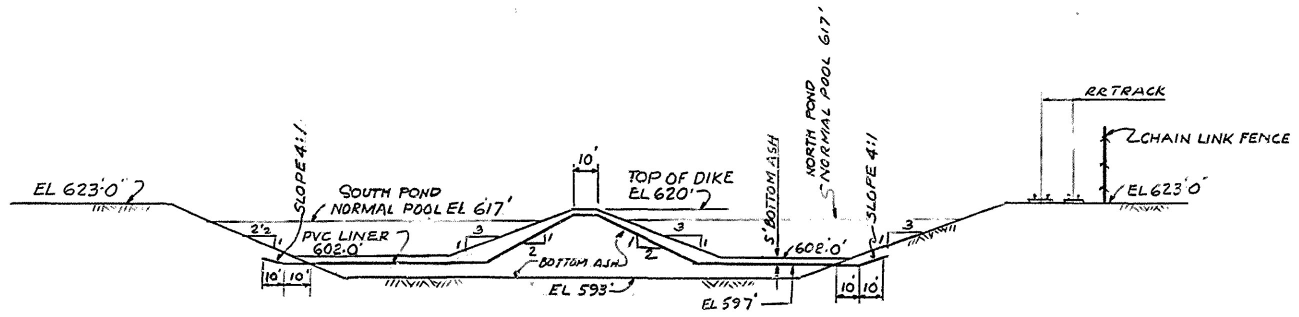
SCALE: 1"=40'
DR. LEN
CH.
SQ. LDR. ME
DATE: 4/20/77
APPROVED BY — ENGINEERING DIV / DESIGN DIV

AMERICAN ELECTRIC POWER SERVICE CORP.

DR. No 12-11341-3851



SECTION A-A



SECTION B-B

DATE	NO.	DESCRIPTION	APPD.

REVISIONS

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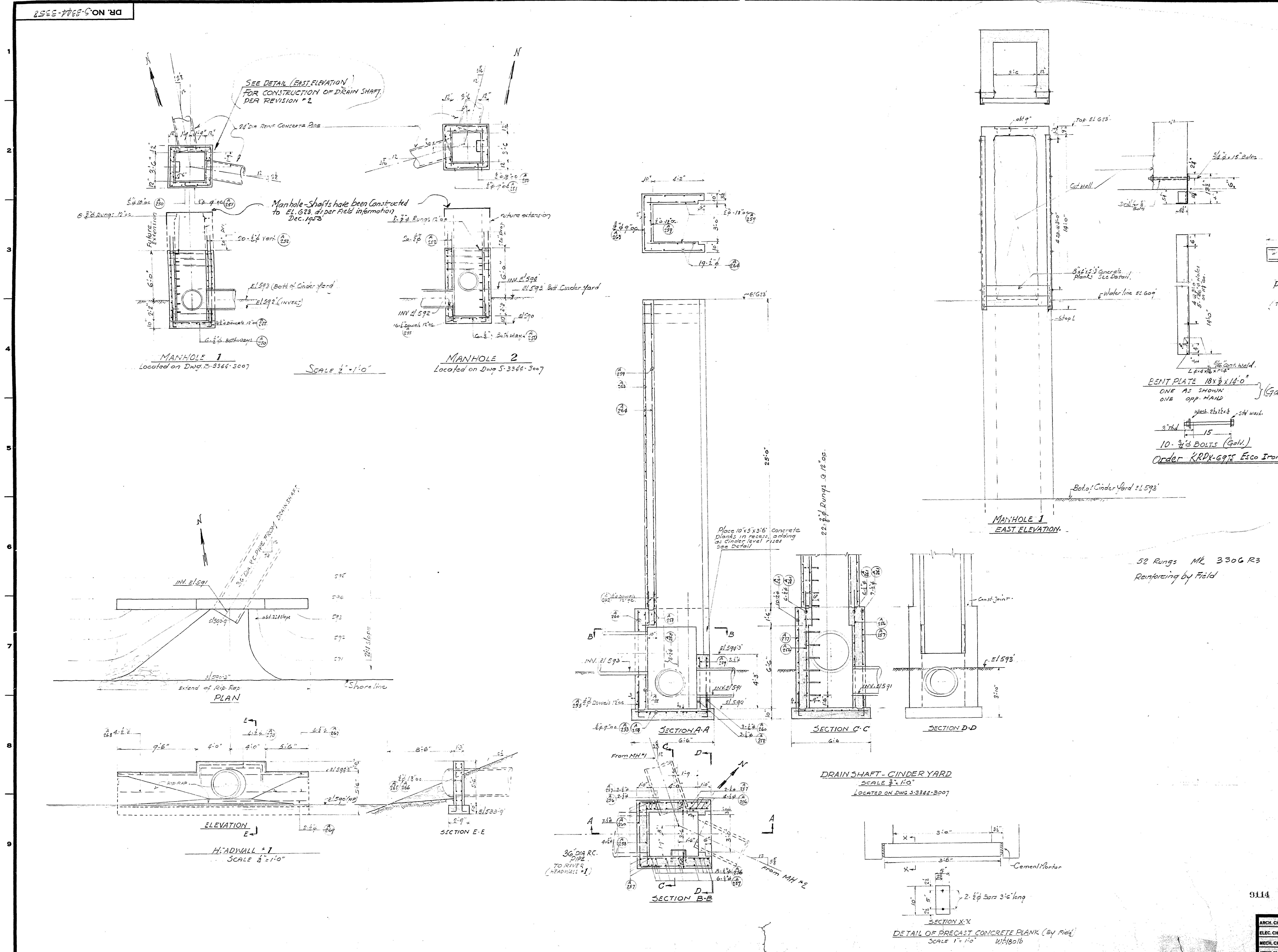
APPALACHIAN POWER CO.
KANAWHA RIVER PLANT
GLASGOW WEST VA.

BOTTOM ASH STORAGE AREA
MODIFICATION
SECTIONS

DR. NO. 12-11341-3851

ARCH.	ELEC.	MECH.	STR.
SCALE: 1"=60'	ENGINEERING DIV		
DR. LEN			
CH.			
SQ. LDR. M.E.	DESIGN DIV		
DATE 4/21/77			

AMERICAN ELECTRIC POWER SERVICE CORP.



Reference Drawings
S-3344-3001 Plot plan
S-3344-3007 Grading Plan
RS-20 Reinf. Sheets 1 to 3

DATE	No.	DESCRIPTION	APPD.
11/17/53	1	Note re. extension of Drainage Manholes 1 & 2 added JW	GR
3/30/54	2	Manhole #1 altered for use as Drain shaft JW	GR
4/20/54	3	changed thrubolt location to 6" edge distance in No1 Shaft JW	GR

REVISIONS

AMERICAN GAS & ELECTRIC SERVICE CORPORATION
30 CHURCH STREET NEW YORK

CINDER-YARD
DRAINAGE STRUCTURES

APPALACHIAN ELECTRIC POWER CO.
KANAWHA RIVER PLANT
GLASGOW, WEST VIRGINIA

9114

SCALE As Noted DATE 5/14/51

ARCH. CH.	DR. BY JW	APPROVED
ELEC. CH.	TR. BY	
MECH. CH.	CH. BY	
STRUCT. CH.		

DR. No. S-3344-3358-3

APPENDIX C

Hydrology and Hydraulic Analysis

Subject:	**H&H ANALYSIS**		
Date:	March 4, 2026	**Made By:**	YCS
Project No.:	US0041868.3860	**Checked By:**	MT
Project Short	AEP/ Ash Pond/ WV	**Reviewed By:**	SJM

OBJECTIVE

The objective of this report is to demonstrate engineering calculations for the hydraulic capacity of the Bottom Ash Pond (BAP) complex as required by the United States Environmental Protection Agency's final rule for Disposal of CCR from Electric Utilities. The BAP Complex, owned by American Electric Power Company, Inc. (AEP), is located along West Virginia State Route 60, adjacent to the Kanawha River. Figure below shows the drainage basins at the BAP complex.

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Date:	March 4, 2026	**Made By:**	YCS
Project No.:	US0041868.3860	**Checked By:**	MT
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TOTAL INFLOW VOLUME

Total drainage areas (North Subbasin & South Subbasin) were delineated using U.S. Geological Survey National Map 3D Elevation Program (3DEP) 1-Meter Resolution DEM (USGS 1 Meter, 2018). Runoff characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55. Time of Concentration calculations were developed using the Technical Paper 55 Urban Hydrology for Small Watersheds (TR-55) method for computation of travel time and time of concentration.

	North	South	
Drainage Basin Area	166	76	acres
Curve Number	65	66	
Time of Concentration (Tc)	0.4	0.3	hours
Time of Concentration (Tc)	27	18	minutes

Rainfall

A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below

Event	Depth (inches)	Temporal Distribution	Depth Source
PMP, 6-Hour	27.94	NRCS 6-Hour	HMR-51

Curve Number

The curve number (CN) for antecedent runoff condition II (ARC-II) was chosen based on the recommended curve numbers given in Tables 9-1, 9-2, and 9-5 of the National Engineering Handbook (NEH) Part 630. Soil types were obtained from the Natural Resources Conservation Service’s online soils database. Land use areas were delineated based on aerial imagery.

			North		South	
Soil Group	Type	CN	Area (acres)	CN*Area	Area (acres)	CN*Area
B	Woods	60	127.1	7,628	52.7	3,160
	Developed, Open Space	69	14.4	991	4.8	332
	Developed, Medium Intensity	85	0.0	0	6.9	583
	Developed, High Intensity	92	11.8	1,085	0.0	0
C	Woods	73	5.4	391	5.4	393
	Developed, Open Space	79	0.0	0	3.9	307
	Developed, Medium Intensity	90	5.4	482	0.0	0
D	Developed, Low Intensity	86	0.0	0	2.8	244
	Developed, Medium Intensity	92	1.9	171	0.0	0
			165.9	10,748	76.5	5,020
		CN = S(CN*Area)/S(Area)	**CN**	**65**	**CN**	**66**

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Time of Concentration

The time of concentration is calculated using the Watershed Lag Method from the National Engineering Handbook Part 630, Chapter 15. The slope is estimated in ArcGIS based on the Lidar dataset dated 2018, and the soil data from USDA SSURGO Database.

	North	South	
Watershed Flow Length (ℓ) =	4,487	2,820	feet
Average Watershed Slope (Y) =	36.00	36.50	%
Maximum Potential Rentention (S) =	5.43	5.23	inches
Lag (L) =	0.27	0.18	hours
Time of Concentration (T_c) =	0.45	0.30	hours
Time of Concentration (T_c) =	27	18	minutes

$$\ell = 209A^{0.6}$$

$$S = \frac{1000}{cn'} - 10$$

$$L = \frac{\ell^{0.8}(S+1)^{0.7}}{1900Y^{0.5}}$$

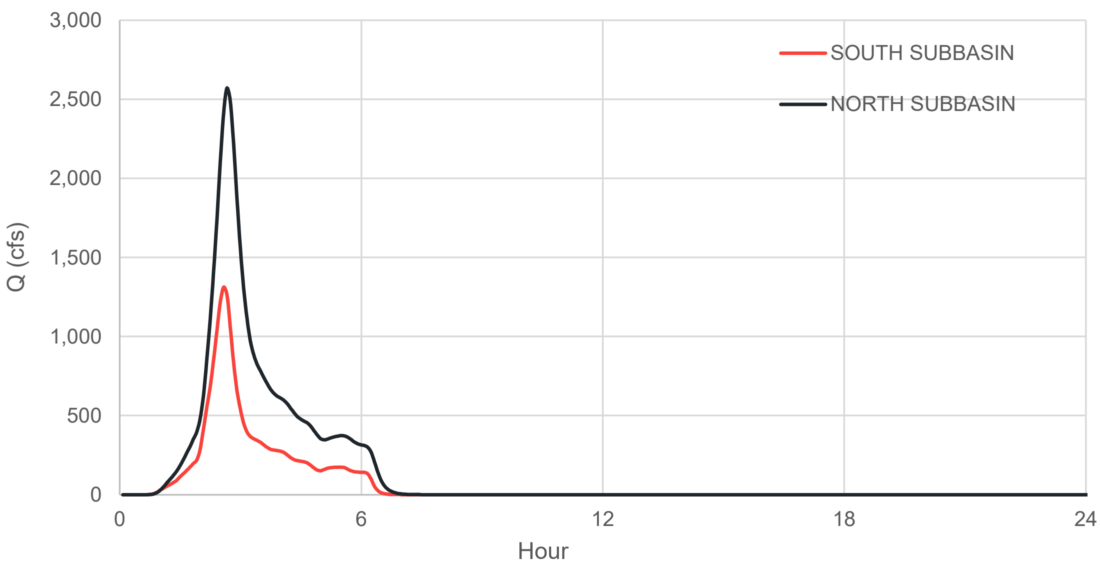
$$T_c = 0.6L$$

Runoff Volume

Runoff values were determined by importing the characteristics developed above into a hydrologic model with the Autodesk Storm and Sanitary Analysis 2022 program.

Total Runoff Volume from North Subbasin (N)	309.4	acre-ft
Total Runoff Volume from South Subbasin (S)	144.0	acre-ft
Total Inflow Volume (N+S)	**453.4**	acre-ft

INFLOW HYDROGRAPH



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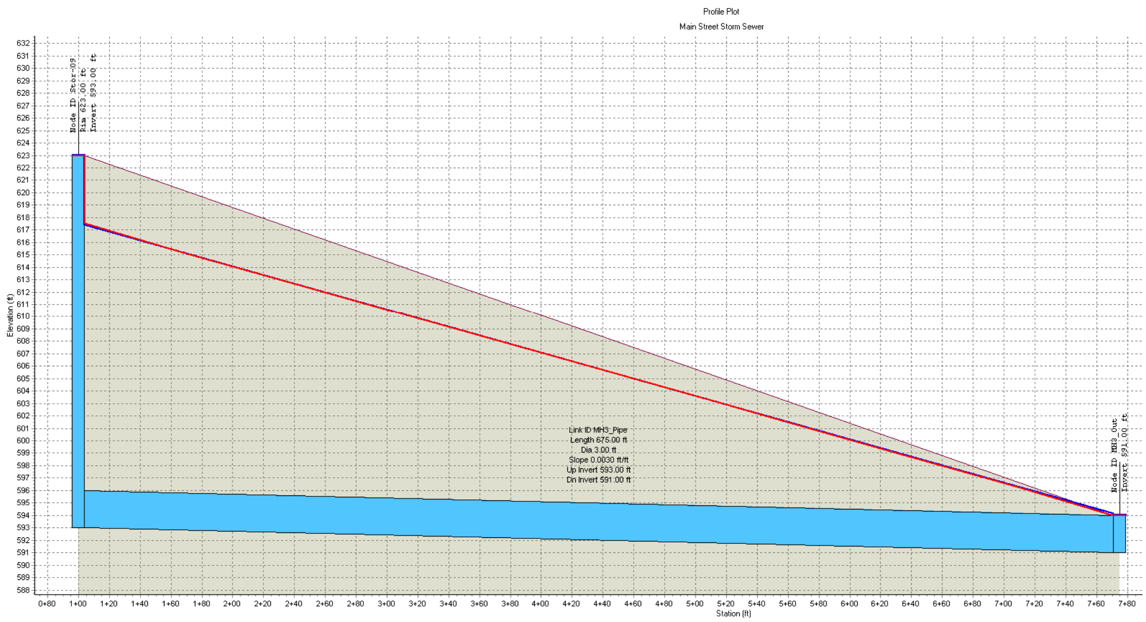
TOTAL OUTFLOW VOLUME

Water from impoundments exits the flood control system through a 36-inch reinforced concrete pipe (RCP). The pipe conveys flows by gravity to the Kanawha River via Outfall 001. The max discharge of the RCP was estimated considering a full pool at 623 ft-msl in the impoundments.



Full Pool Elevation	623	ft-msl	
Pipe Diamater	36	inch	
Pipe Length	675	feet	
Pipe Inlet Invert Elevation	593	feet	
Pipe Outlet Invert Elevation	591	feet	
100-Year Flood Elevation	610	feet	
Max Pipe Discharge	108	cfs	(free)
Max Pipe Discharge @ 100-Yr Flood	72	cfs	

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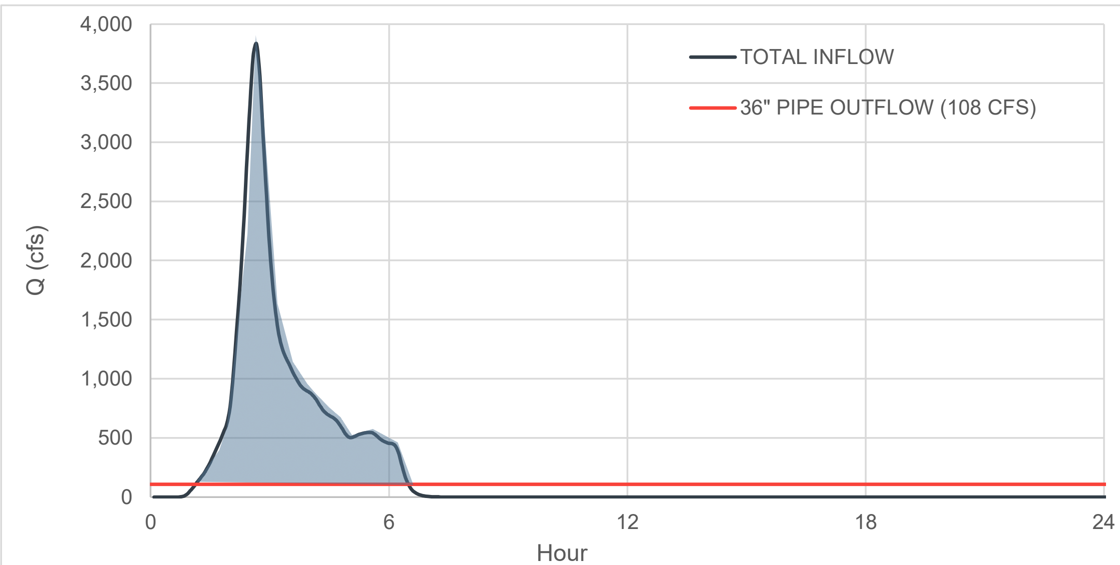
RESERVOIR CAPACITY REQUIRED DURING PMP EVENT

Reservoir capacity required during the PMP event was determined using the SSA. The inflow and outflow hydrograph of the BAP complex is shown as below.



Required Reservoir Capacity, V_R **402.8** acre-ft

BAP COMPLEX STORAGE VOLUME

Total Clearwater Pond Volume (A)	26.3	acre-ft	
Total North Pond Volume (B)	21.3	acre-ft	
Total South Pond Volume (C)	26.1	acre-ft	
Total Storage Volume, V_s (A+B+C)	**73.6**	acre-ft	$V_s < V_R$

The total storage volume for BAP complex is less than the required reservoir capacity during the PMP event. This assumes that all water from the North and South Subbasins that is not routed through the 36-inch outlet pipe will flow into the impoundments.

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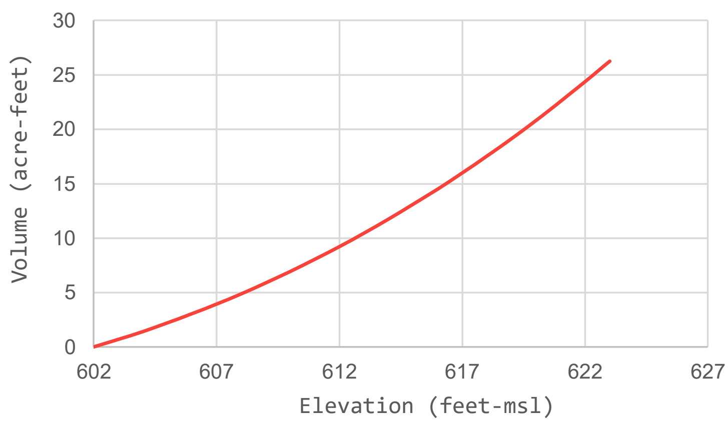
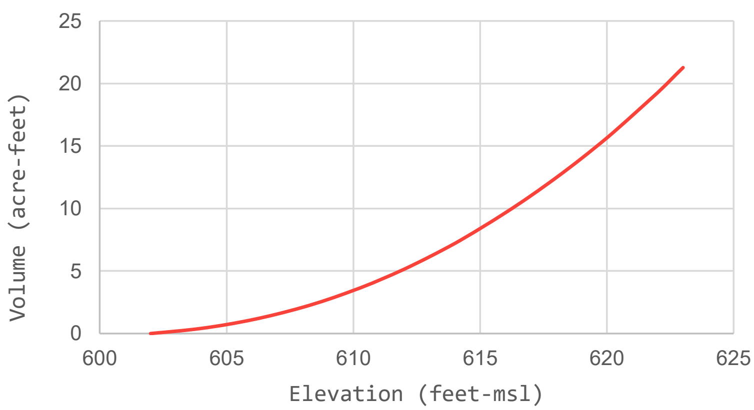
STAGE STORAGE CURVE

CLEARWATER POND



Elevation (feet-msl)	Volume (acre-feet)	
602	0.0	Pond Bottom
604	1.4	
606	3.1	
608	4.9	
610	6.9	
612	9.2	
613	10.5	Normal Pool
614	11.8	
616	14.5	
618	17.5	
620	20.8	
622	24.4	
623	26.3	Top of Dam

NORTH POND



Elevation (feet-msl)	Volume (acre-feet)	
602	0.0	Pond Bottom
604	0.4	
606	1.1	
608	2.1	
610	3.4	
612	5.1	
614	7.2	
616	9.7	
617	11.0	Normal Pool
618	12.5	
620	15.7	
622	19.3	Top of Dam
623	21.3	

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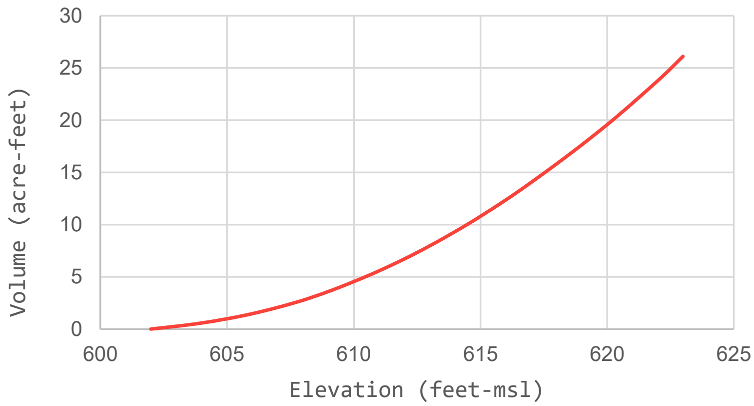
SOUTH POND



Elevation (feet-msl)	Volume (acre-feet)	
602	0.0	Pond Bottom
604	0.6	
606	1.5	
608	2.8	
610	4.5	
612	6.7	
614	9.3	
616	12.4	
617	14.0	Normal Pool
618	15.8	
620	19.6	
622	23.8	Top of Dam
623	26.1	

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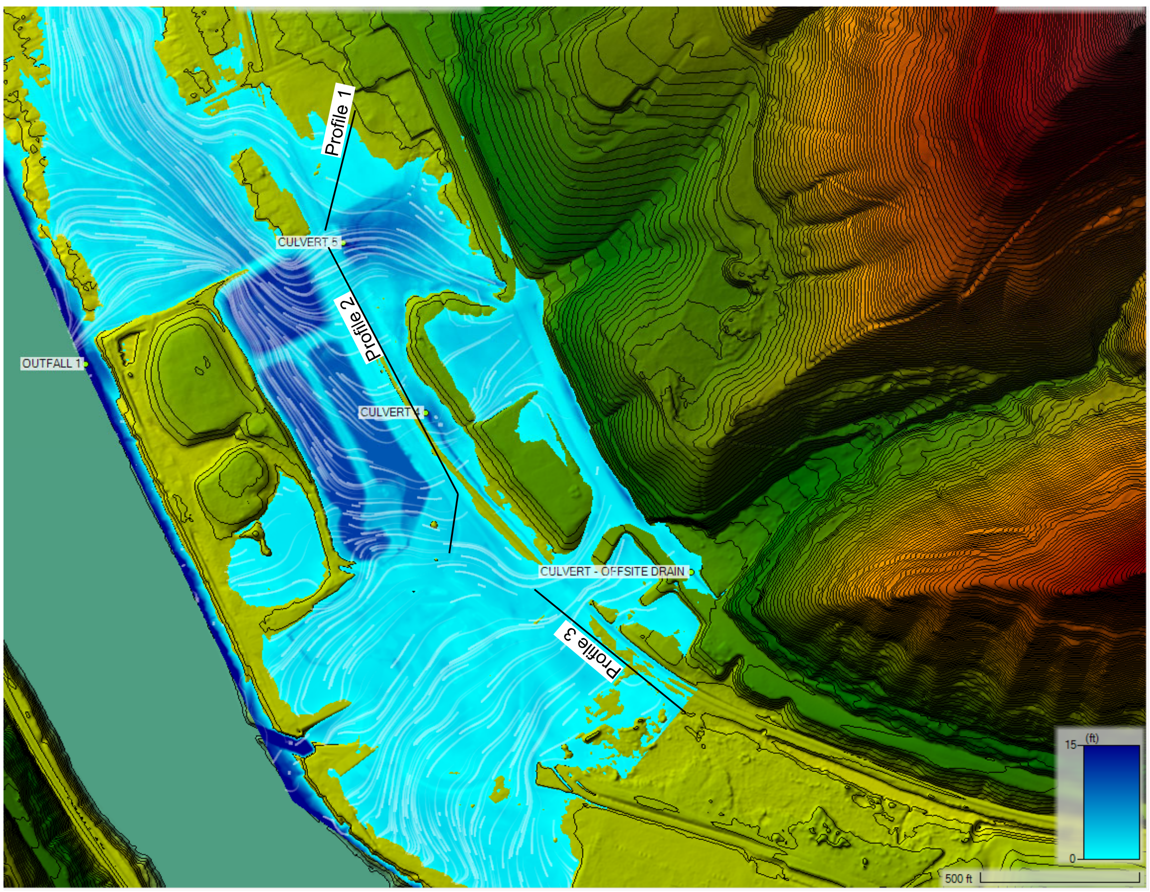
MODEL RESULTS

Runoff from the North and South subbasins during the PMP 6-hour event was routed using the Army Corps of Engineers HEC-RAS program Version 6.6. The downstream boundary condition was set to the 100-year flood elevation of 610 feet-msl in the Kanawha River. The analysis considered overland flow routing based on topography without incorporating conveyance structures. Figure below illustrates the resulting inundation extent and flow directions during the PMP 6-hour event.



	Subbasin Inflow	Profile 1	Profile 2	Profile 3
Peak flow (cfs)	3834	412	2760	722
Volume (acre-ft)	453	60	313	73

The above analysis shows that routing the outflow from the North and South Subbasins combined will direct approximately 313 acre-ft of stormwater into the BAP complex over an approximate 5-hour period. This inflow into the BAP complex far exceeds the existing capacity of the complex which is 73.6 acre-ft. Thus, the BAP complex would overtop and convey stormwater into the adjacent neighborhood located to the north of the complex. The CCR unit cannot adequately manage flow following the peak discharge of the inflow design flood as required by the CCR Rule.

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