Periodic Inflow Design Flood Control System Plan

Fly Ash Impoundment
Sibley Generating Station

Evergy Missouri West, Inc.

October 2021

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1. Introduction

1.1 Purpose

The purpose of this Periodic Inflow Design Flood Control System Plan is to document that the requirements specified in 40 CFR §257.82 of the Coal Combustion Residual (CCR) Rule[1] have been met for the Fly Ash Impoundment at Evergy Missouri West, Inc. (Evergy) Sibley Generating Station. The Fly Ash Impoundment is an existing CCR surface impoundment as defined by 40 CFR §257.53. Placement of CCR in the Fly Ash Impoundment has ceased, and the impoundment is currently undergoing closure by removal. Construction activities for closure of the Fly Ash Impoundment are ongoing and this report documents the current status of the impoundment.

1.2 Regulatory Requirements

In accordance with the CCR Rule, this plan documents how the inflow design flood control system has been designed and constructed to meet the requirements of 40 CFR §257.82 referenced below and is supported by appropriate engineering calculations. The Initial Inflow Design Flood Control System Plan was completed October 13, 2016. Periodic inflow design flood control system plans shall be prepared every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first periodic plan. This Periodic Inflow Design Flood Control System Plan has therefore been completed no later than October 13, 2021. This plan shall be amended whenever there is a change in conditions that would substantially affect the written plan in effect.

Regulatory Citation: 40 CFR §257.82 (a); Design, construct, operate, and maintain an inflow design flood control system as specified:

- (1) Inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflows design flood specified in paragraph (3);
- (2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (3);
- (3) The inflow design flood is: (i) For a high hazard potential CCR surface impoundment, the probable maximum flood; (ii) For a significant hazard potential CCR surface impoundment, the 1000-year flood; (iii) For a low hazard potential CCR surface impoundment, the 100-year flood; or (iv) For an incised CCR surface impoundment, the 25-year flood.

Regulatory Citation: 40 CFR §257.82 (b); Discharge from the CCR unit must be handled in accordance with the surface water requirements under: §257.3 – 3.

1.3 Brief Description of Impoundment

The Sibley Generating Station is a coal-fired power plant located near Sibley in Jackson County, Missouri. The Station is located east of Sibley and is bordered to the north by the Missouri River. The Fly Ash Impoundment is located on plant property and has initiated closure. A site Location Map showing the area surrounding the station is in **Figure 1** of **Appendix A**.

1.3.1 Design and Construction

The original construction of the impoundment was substantially completed in 1977. Earthen embankments were constructed to create the impoundment. When constructed the embankment was approximately 2,800 feet long, a maximum of 15 feet high, and with 3 to 1 (horizontal to vertical) side slopes covered with grassy vegetation[2]. The embankment crest elevation was approximately 725.0 feet (unless otherwise noted, all elevations in this plan are in the NGVD29 datum), and the crest width was

approximately 20 feet. The impoundment is currently undergoing closure activities which have reconfigured the embankment. Per Burns & McDonnell construction plans[3], the embankment is now approximately 2,400 feet long, a maximum of 14 feet high, and with 3 to 1 (horizontal to vertical) side slopes. The embankment crest elevation is approximately 719 feet and the crest width is approximately 20 feet. The surface area of the impoundment as measured from the center line of the perimeter roadway is approximately 17.0 acres. Burns & McDonnell construction plans include breaching the embankment on the east side so that it will no longer impound water. At the time this report was completed, the impoundment breach had not been completed. Therefore, this report considers the interim condition prior to breaching the embankment to confirm that the CCR Rule requirements are still met during the interim until the breach is completed in Fall 2021.

1.3.2 Inflow from Plant Operations and Stormwater Runoff

Sibley Generating Station is no longer in operation and the Fly Ash Impoundment is currently undergoing closure by removal. The watershed for the Fly Ash Impoundment includes the perimeter road around the embankment, the entirety of the area within the embankment, and an upland drainage area south of the impoundment.

1.3.3 Outlet Structures

The outlet structure for the impoundment has been removed from service and is being demolished. The most recent construction schedule includes construction of a breach in the east embankment during November 2021. Once breached, accumulated non-industrialized water will discharge from the impoundment through the embankment breach on the east side. This land disturbance activity is covered under Section (E) of the Sibley Generation Station NPDES permit (Permit No. 0004871) as the discharge is associated with Outfall 007. The breach is currently planned to be approximately 112 feet wide at an elevation 704 feet but could change depending on construction needs. Due to the elimination of the sedimentation basin, alternative stormwater best management practices will be implemented. A rock check dam is planned for the width of the breach, 18 inch in height, 2H:1V side slopes, and width of 20 feet. After flowing through the breach, runoff will discharge to a tributary that that ultimately leads to the Missouri River. Current Outfall 007 will be closed out as a wastewater outfall as the water is no longer wastewater and the discharge is stormwater only from construction activities. After the site reaches the final state, a NPDES permit modification will be submitted to eliminate all outfalls that no longer discharge wastewater or industrialized stormwater.

1.4 Plan Approach

Analyses and calculations completed for the hydrologic and hydraulic assessments of the Fly Ash Impoundment are described in this plan and included in **Appendix B**. Data and analyses results are based on design information shown on Burns & McDonnell construction drawings[3]. The analysis approach and results of the hydrologic and hydraulic analyses are presented in following sections. The results of this analysis will be used by AECOM to confirm that the Fly Ash Impoundment meets the hydrologic and hydraulic capacity requirements of the rules referenced above for CCR surface impoundments. **Table 1** cross references the Plan sections to the applicable CCR Rule requirements.

Table 1. CCR Rule Cross Reference Table

Plan Section	Title	CCR Rule Reference
4.1	Inflow Analysis	§257.82 (a)(1)
4.2	Outflow Analysis	§257.82 (a)(2)
4.3	Inflow Design Flood	§257.82 (a)(3)
4.4	Discharge handled in accordance with §257.3 – 3	§257.82 (b)

2. Hydraulic Analysis

2.1 Design Storm

The Fly Ash Impoundment has been categorized by others[4] as a "Low Hazard Potential CCR Impoundment", which by statute requires that the inflow design flood is the 100-year return frequency design storm event.

2.2 Rainfall Data

The rainfall information used in the analysis was based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 8, Version 2[5] which provides rainfall data for storm events with average recurrence intervals ranging from 1 to 1,000 years and durations ranging from 5 minutes to 60 days. The design storm rainfall depth, obtained from the NOAA website, is 8.98 inches for the 24-hour, 100-year storm. The Soil Conservation Service (SCS) Type II rainfall distribution used by AECOM is appropriate to use for storms up to the 1,000-year flood at the project site.

2.3 Runoff Computations

The drainage areas for the Fly Ash Impoundment were determined using a computer-aided design (CAD) analysis of the Burns & McDonnel construction drawings[3]. The impoundment receives water that falls directly within the impoundment footprint, runoff from the entire perimeter road, and runoff from an upland field south of the impoundment. The total drainage area to the impoundment is approximately 45.0 acres. See **Figure 2** in **Appendix A** for the Drainage Area Map.

Runoff was calculated using the SCS Curve Number Method, where curve numbers (CN) were assigned to each subcatchment based on the type of land cover and soil type present. Using the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey[6], the soil type of the site was determined to be hydrologic soil group C. CN values for the land cover were selected from the CN Table available in HydroCAD. This data was obtained from the SCS NRCS Technical Release-55 publication[7]. Gravel Surface, Grass Cover, Woods, Straight Row Crops, and Paved Road land covers that are located on site were determined to have a CN value of 96, 74, 70, 85, and 92 respectively. A composite CN was calculated for each sub-catchment area by summing the products of each CN multiplied by its percentage of the total area. Calculations for the weighted runoff curve numbers for each sub-watershed were performed in HydroCAD.

Stormwater runoff from the 100-year event into the impoundment has a peak inflow of 322.1 cfs and total inflow volume of 24.2 acre-feet.

3. Hydraulic Analyses

3.1 Process Flows

CCR placement in the Fly Ash Impoundment has been discontinued and the impoundment is currently undergoing closure by removal. Thus, there are no inflows to the impoundment other than precipitation.

3.2 Storage Capacity

The storage capacity of the Fly Ash Impoundment is 161.2 acre-feet during interim construction activities. Once construction activities are complete, there will be no storage capacity potential within the Fly Ash Impoundment.

3.3 Discharge Analysis

A hydraulic model was created in HydroCAD to assess the capacity of the impoundments to store and convey the stormwater flows. HydroCAD has the capability to evaluate multiple impoundments within a network and to respond to variable tailwater, pumping rates, and reversing flows. HydroCAD routing calculations reevaluate the impoundment's discharge capability at each time increment, making the program an efficient and dynamic tool for this evaluation.

The analyzed scenario assumes the starting water surface elevation of the Fly Ash Impoundment is 704.0 feet. At this elevation, there is no water present in the impoundment and no baseflow discharge occurs. Stormwater runoff is not currently discharged from the impoundment. A future breach in the east side embankment will discharge stormwater as required and approved under the Missouri NPDES system following the completion of construction activities, into a tributary which ultimately leads to the Missouri River. Therefore, the facility does not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the NPDES under Section 402 of the Clean Water Act.

4. Results

The hydrologic and hydraulic conditions of Fly Ash Impoundment were modeled with the peak discharge of the 100-year storm event. The hydrologic and hydraulic analyses and calculations for the Fly Ash Impoundment are summarized below and included in **Appendix B.**

4.1 Inflow Analysis – §257.82 (a)(1)

Adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood.

Background and Assessment

The impoundment receives water that falls directly within the impoundment footprint, runoff from the entire perimeter road, and runoff from an upland field south of the impoundment. The rainfall within and south of the embankments produces the total inflow to the Fly Ash Impoundment. Using the HydroCAD model, the total inflow was stored within the Fly Ash Impoundment to determine the peak water surface elevations.

Table 2 summarizes the water surface elevations of the Fly Ash Impoundment prior to and after the inflow design flood.

Table 2. Summary of Hydrologic and Hydraulic Analysis 100-Year, 24-Hour Storm

CCR Unit	Beginning WSE (feet)	Peak WSE (feet)	Crest Elevation (feet)	Freeboard Above Peak WSE (feet)
Fly Ash Impoundment	704.0	708.8	719.0	10.2

Conclusion and Recommendation

As there is adequate storage within the Fly Ash Impoundment to manage the inflow design flood, there is no anticipated overtopping of the embankments, which meets the requirements in §257.82 (a)(1).

4.2 Outflow Analysis – §257.82 (a)(2)

Adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood.

Background and Assessment

There are currently no outlet structures in the Fly Ash Impoundment due to ongoing construction activities. As a result, the outflow analysis does not apply to the interim condition.

Conclusion and Recommendation

As the Fly Ash Impoundment can store the entire inflow design flood without the peak water surface elevation overtopping the embankment, the impoundment meets the requirements in §257.82 (a)(2).

4.3 Inflow Design Flood – §257.82 (a)(3)

Required Inflow design flood for Low Hazard Potential Impoundment.

Background and Assessment

The calculations for the inflow design flood are based on the hazard potential given to the impoundment. The different classifications of the impoundment hazard potential are high, significant, and low.

Conclusion and Recommendation

As the impoundment hazard potential category is Low[4], the 100-year design storm was utilized in the analysis, which meets the requirements in §257.82 (a)(3).

4.4 Discharge – §257.82 (b)

Discharge from the CCR unit handled in accordance with the surface water requirements under: §257.3 – 3.

Background and Assessment

There is no discharge from the Fly Ash Impoundment during the current interim construction conditions. All stormwater runoff is stored within the impoundment. Following the completion of construction, when the unit no longer meets the definition of "Surface Impoundment" under the CCR Rule, the discharge will enter a tributary that leads to the Missouri River. Evergy plans to manage this discharge in compliance with Missouri NPDES system, as required.

Conclusion and Recommendation

There is currently no discharge from the Fly Ash Impoundment. Therefore, the facility does not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the NPDES under Section 402 of the Clean Water Act, and thereby meets the requirements in §257.82 (b).

5. Conclusions

The hazard classification assessments conducted by others concluded that the Hazard Potential category of the impoundment is Low[4]. Construction activities for closure of the Fly Ash Impoundment are ongoing, and the current interim condition of the impoundment was evaluated to ensure that the CCR Rule requirements are still met during the interim condition until construction is completed in Fall 2021. In the interim condition, the inflow design flood control system of the Fly Ash Impoundment adequately manages flow into the CCR unit during, and following, the peak discharge of the 100-year, 24-hour frequency storm event inflow design flood. In the interim condition, the inflow design flood control system of the Fly Ash Impoundment adequately manages flow from the CCR unit to collect and control the peak discharge resulting from the 100-year, 24-hour frequency storm event inflow design flood by storing the entire inflow design flood without discharging. In the interim condition, there is no discharge from the Fly Ash Impoundment, but upon completion of construction activities, discharge from the Fly Ash Impoundment will be handled in accordance with the surface water requirements of §257.3 – 3 during the 100-year, 24-hour flood event. Therefore, the Fly Ash Impoundment meets the requirements for certification.

The contents of this plan, specifically **Sections 1** through **5**, represent the Periodic Inflow Design Flood Control System Plan for this unit.

6. Limitations

Background information, design basis, and other data have been furnished to AECOM by Evergy, which AECOM has used in preparing this plan. AECOM has relied on this information as furnished and is not responsible for the accuracy of this information. Our recommendations are based on available information from previous and current investigations. These recommendations may be updated as future investigations are performed.

The conclusions presented in this plan are intended only for the purpose, site location, and project indicated. The recommendations presented in this plan should not be used for other projects or purposes. Conclusions or recommendations made from these data by others are their responsibility. The conclusions and recommendations are based on AECOM's understanding of current plant operations, maintenance, stormwater handling, and ash handling procedures at the station, as provided by Evergy. Changes in any of these operations or procedures may invalidate the findings in this plan until AECOM has had the opportunity to review the findings and revise the plan if necessary.

This hydrologic and hydraulic analysis was performed in accordance with the standard of care commonly used as state-of-practice in our profession. Specifically, our services have been performed in accordance with accepted principles and practices of the hydrologic and hydraulic engineering profession. The conclusions presented in this plan are professional opinions based on the indicated project criteria and data available at the time this plan was prepared. Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation is intended.

7. Certification Statement

CCR Unit: Evergy Sibley Generating Station, Fly Ash Impoundment

I, Joslyn Townsend, being a Registered Professional Engineer in good standing in the State of Missouri, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the Periodic Inflow Design Flood Control System Plan dated October 8, 2021, which includes all pages in Sections 1 through 5, meets the requirements of 40 CFR § 257.82.

Joslyn Townsend
Printed Name

October 8, 2021
Date

AECOM
2380 McGee Street, Suite 200
Kansas City, Missouri 64108
1-816-561-4443

8. References

1. U.S. Environmental Protection Agency, Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, 40 CFR §257. Federal Register 80, Subpart D, April 17, 2015.
2. AECOM, History of Construction Report, Fly Ash Impoundment, Sibley Generating Station, KCP&L Greater Missouri Operations Company, dated October 2016.
3. Burns and McDonnell, Impoundment Closure and Site Restoration Issued for Construction Drawings, Sibley Generating Staion, KCP&L, dated 2019.
4. SCS Engineers, Periodic Hazard Potential Classification Assessment Report, Sibley Generating Station Fly Ash Impoundment, Evergy Missouri West, Inc., dated October 2021.
5. National Oceanic and Atmospheric Administration, NOAA Atlas 14 Point Precipitation Frequency Estimates, Volume 8, Version 2, http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=il, dated 2021.
6. USDA Natural Resources Conservation Service, Web Soil Survey, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, dated 2021.
7. USDA Natural Resources Conservation Service, Technical Release 55, dated June 1986.

Appendix A Figures

N

600 0 600

SCALE IN FEET

SOURCE: 2014 BUCKNER, MISSOURI USGS 7.5 MINUTE QUADRANGLE

PROJECT NUMBER AND TASK: 60661844		REV. NO.	BY	DATE	REVISIONS DESCRIPTION
DRAWN BY: TMS	DESIGNED BY: -				
CHECKED BY: JAT	APPROVED BY: JAT				
DATE: SEPTEMBER 20, 2021					

AECOM

2380 McGee Street, Suite 200
Kansas City, Missouri 64108

EVERGY METRO, INC.
SIBLEY GENERATING STATION
SIBLEY, MISSOURI

LOCATION MAP

FIGURE 1

September 20, 2021 9:23:01 pm (mik)
J:\Evergy Sibley IDF 2021\Location Map.dwg

N

100 0 100

SCALE IN FEET

SOURCE: GOOGLE EARTH PRO IMAGE DATED APRIL 2021, BURNS & MCDONNELL CONSTRUCTION DRAWINGS DATED NOVEMBER 2019 AND EVERGY SUPPLIED SITE TOPOGRAPHY DATED MAY 2015.

PROJECT NUMBER AND TASK:	60661844
DRAWN BY:	TMS
DESIGNED BY:	-
CHECKED BY:	JAT
APPROVED BY:	JAT
DATE:	SEPTEMBER 20, 2021

REV. NO.	BY	DATE	REVISIONS DESCRIPTION

AECOM
2380 McGee Street, Suite 200
Kansas City, Missouri 64108

EVERGY METRO, INC.
SIBLEY GENERATING STATION
SIBLEY, MISSOURI

WATERSHED AREA MAP

FIGURE 2

October 1, 2021 6:02:09 pm (mik)
J:\Evergy Sibley IDF 2021\Drainage Area Map.dwg

Appendix B Hydrologic and Hydraulic Support Calculations

B.1 NOAA Rainfall Depths

B.2 NRCS Web Soil Survey Map

B.3 Hydrologic Parameter Calculations

B.4 Burns & McDonnell Construction Drawings

B.1 NOAA Rainfall Depths

NOAA Atlas 14, Volume 8, Version 2
Location name: Sibley, Missouri, USA*
Latitude: 39.1798°, Longitude: -94.1934°
Elevation: 805.9 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.405** (0.320-0.514)	**0.472** (0.373-0.600)	**0.587** (0.462-0.748)	**0.686** (0.537-0.877)	**0.828** (0.630-1.10)	**0.943** (0.701-1.26)	**1.06** (0.763-1.45)	**1.19** (0.820-1.65)	**1.36** (0.904-1.94)	**1.49** (0.967-2.15)
10-min	**0.593** (0.468-0.753)	**0.692** (0.546-0.879)	**0.859** (0.676-1.10)	**1.00** (0.786-1.29)	**1.21** (0.922-1.60)	**1.38** (1.03-1.84)	**1.55** (1.12-2.12)	**1.74** (1.20-2.42)	**1.99** (1.32-2.84)	**2.18** (1.42-3.15)
15-min	**0.723** (0.571-0.918)	**0.843** (0.665-1.07)	**1.05** (0.824-1.34)	**1.23** (0.958-1.57)	**1.48** (1.13-1.96)	**1.68** (1.25-2.25)	**1.90** (1.36-2.58)	**2.12** (1.46-2.95)	**2.42** (1.61-3.46)	**2.66** (1.73-3.84)
30-min	**1.01** (0.796-1.28)	**1.18** (0.931-1.50)	**1.47** (1.16-1.88)	**1.73** (1.35-2.21)	**2.09** (1.59-2.75)	**2.37** (1.76-3.17)	**2.67** (1.92-3.64)	**2.98** (2.06-4.16)	**3.41** (2.27-4.87)	**3.74** (2.43-5.41)
60-min	**1.33** (1.05-1.68)	**1.57** (1.24-2.00)	**1.98** (1.56-2.52)	**2.33** (1.82-2.98)	**2.83** (2.15-3.74)	**3.24** (2.40-4.32)	**3.65** (2.62-4.97)	**4.08** (2.82-5.69)	**4.67** (3.11-6.66)	**5.13** (3.33-7.40)
2-hr	**1.64** (1.31-2.07)	**1.96** (1.56-2.47)	**2.49** (1.97-3.15)	**2.94** (2.32-3.73)	**3.58** (2.74-4.70)	**4.10** (3.06-5.43)	**4.62** (3.35-6.26)	**5.17** (3.60-7.16)	**5.92** (3.98-8.40)	**6.51** (4.26-9.33)
3-hr	**1.86** (1.49-2.34)	**2.23** (1.78-2.80)	**2.85** (2.27-3.59)	**3.38** (2.67-4.28)	**4.14** (3.18-5.41)	**4.74** (3.56-6.26)	**5.37** (3.90-7.24)	**6.02** (4.21-8.30)	**6.90** (4.66-9.75)	**7.60** (5.00-10.9)
6-hr	**2.25** (1.81-2.80)	**2.70** (2.16-3.37)	**3.46** (2.77-4.33)	**4.13** (3.28-5.18)	**5.08** (3.94-6.60)	**5.85** (4.43-7.68)	**6.65** (4.88-8.91)	**7.49** (5.28-10.3)	**8.64** (5.88-12.1)	**9.55** (6.33-13.5)
12-hr	**2.64** (2.14-3.27)	**3.15** (2.55-3.90)	**4.03** (3.25-5.01)	**4.81** (3.86-6.00)	**5.95** (4.65-7.70)	**6.88** (5.25-8.99)	**7.86** (5.81-10.5)	**8.90** (6.33-12.1)	**10.3** (7.10-14.4)	**11.5** (7.68-16.2)
24-hr	**3.05** (2.49-3.75)	**3.62** (2.94-4.45)	**4.60** (3.73-5.68)	**5.48** (4.42-6.79)	**6.78** (5.35-8.73)	**7.85** (6.04-10.2)	**8.98** (6.70-11.9)	**10.2** (7.32-13.8)	**11.9** (8.24-16.5)	**13.2** (8.93-18.5)
2-day	**3.53** (2.90-4.31)	**4.14** (3.39-5.06)	**5.21** (4.25-6.38)	**6.16** (5.01-7.57)	**7.57** (6.01-9.67)	**8.73** (6.77-11.3)	**9.96** (7.49-13.1)	**11.3** (8.17-15.2)	**13.1** (9.18-18.1)	**14.6** (9.94-20.3)
3-day	**3.92** (3.23-4.76)	**4.51** (3.71-5.49)	**5.57** (4.57-6.79)	**6.52** (5.32-7.97)	**7.93** (6.34-10.1)	**9.11** (7.11-11.7)	**10.4** (7.84-13.6)	**11.7** (8.54-15.7)	**13.6** (9.58-18.7)	**15.2** (10.4-21.0)
4-day	**4.24** (3.50-5.14)	**4.83** (3.99-5.86)	**5.87** (4.83-7.14)	**6.81** (5.58-8.31)	**8.22** (6.59-10.4)	**9.40** (7.36-12.0)	**10.7** (8.08-13.9)	**12.0** (8.78-16.1)	**13.9** (9.82-19.1)	**15.5** (10.6-21.3)
7-day	**5.01** (4.16-6.03)	**5.64** (4.68-6.80)	**6.74** (5.58-8.15)	**7.71** (6.35-9.36)	**9.13** (7.34-11.5)	**10.3** (8.09-13.1)	**11.5** (8.77-14.9)	**12.8** (9.40-17.0)	**14.6** (10.4-19.8)	**16.1** (11.1-22.0)
10-day	**5.67** (4.72-6.80)	**6.38** (5.32-7.67)	**7.59** (6.30-9.14)	**8.63** (7.13-10.4)	**10.1** (8.13-12.6)	**11.3** (8.89-14.2)	**12.5** (9.55-16.1)	**13.8** (10.1-18.1)	**15.5** (11.0-20.9)	**16.9** (11.7-23.0)
20-day	**7.56** (6.35-9.01)	**8.54** (7.16-10.2)	**10.1** (8.47-12.1)	**11.4** (9.52-13.7)	**13.2** (10.7-16.2)	**14.6** (11.5-18.1)	**15.9** (12.2-20.2)	**17.3** (12.8-22.5)	**19.0** (13.6-25.4)	**20.4** (14.2-27.6)
30-day	**9.16** (7.72-10.9)	**10.4** (8.72-12.3)	**12.3** (10.3-14.6)	**13.8** (11.5-16.5)	**15.8** (12.8-19.3)	**17.4** (13.8-21.4)	**18.8** (14.5-23.8)	**20.3** (15.1-26.2)	**22.1** (15.9-29.3)	**23.5** (16.5-31.7)
45-day	**11.2** (9.48-13.2)	**12.6** (10.7-14.9)	**14.9** (12.6-17.7)	**16.7** (14.0-19.9)	**19.1** (15.5-23.1)	**20.8** (16.5-25.5)	**22.4** (17.3-28.1)	**23.9** (17.8-30.8)	**25.9** (18.6-34.1)	**27.2** (19.2-36.6)
60-day	**12.9** (11.0-15.2)	**14.6** (12.4-17.2)	**17.2** (14.5-20.3)	**19.2** (16.1-22.7)	**21.7** (17.7-26.2)	**23.6** (18.8-28.8)	**25.3** (19.6-31.6)	**26.9** (20.1-34.4)	**28.9** (20.8-37.9)	**30.2** (21.4-40.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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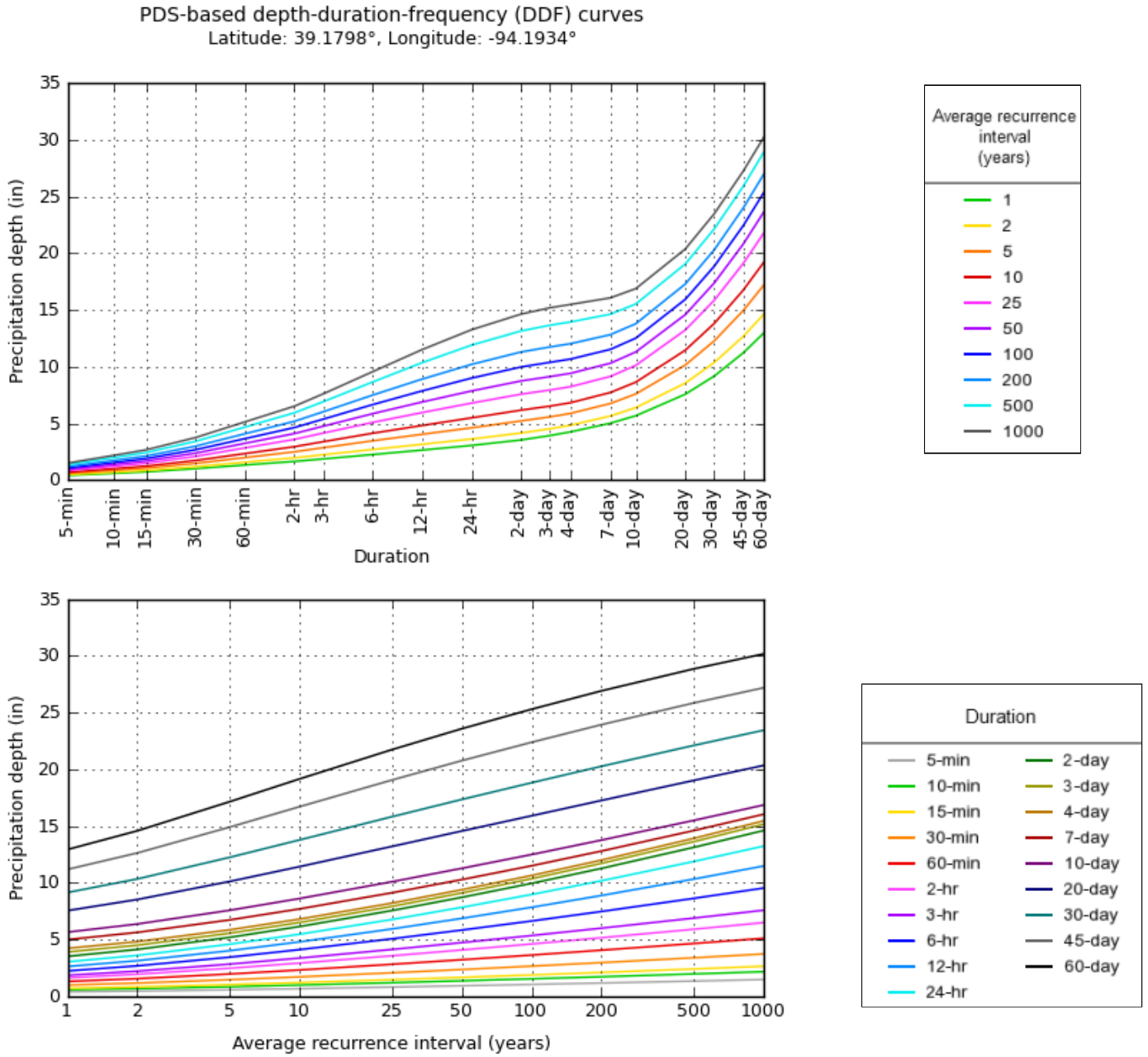
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Tue Sep 7 21:06:46 2021

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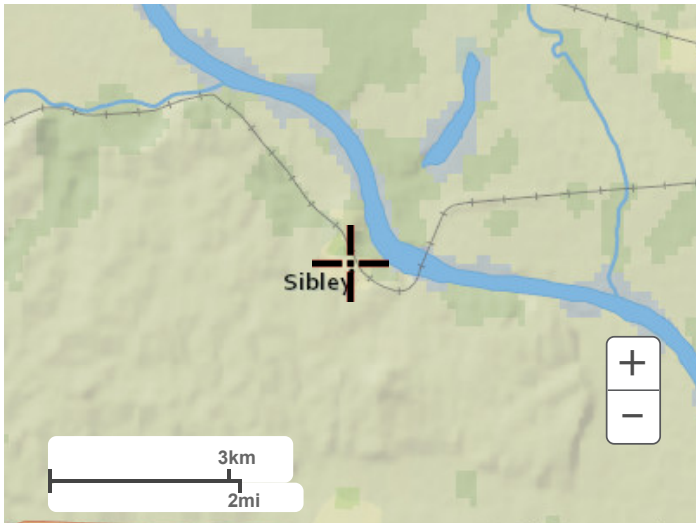
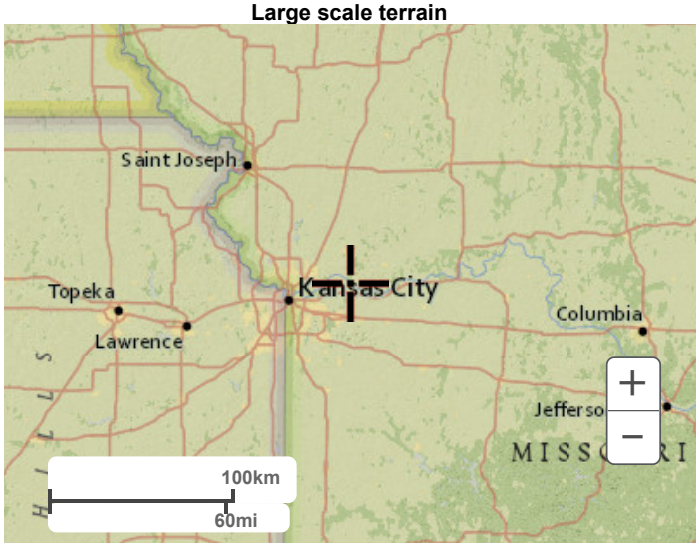
Maps & aerials

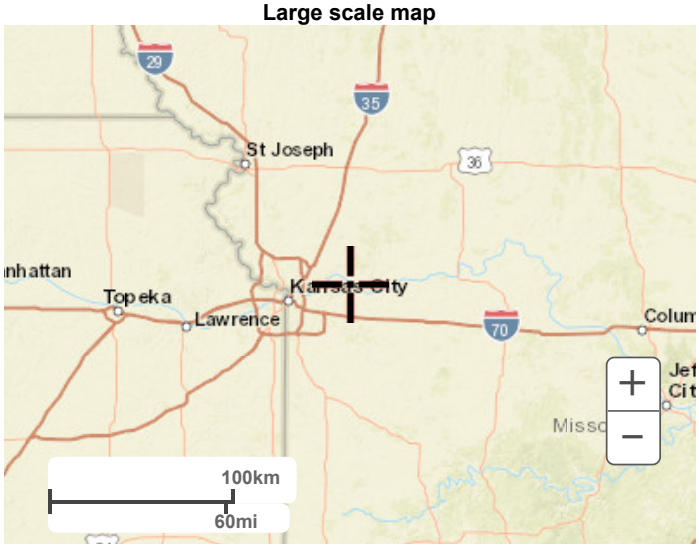
Small scale terrain



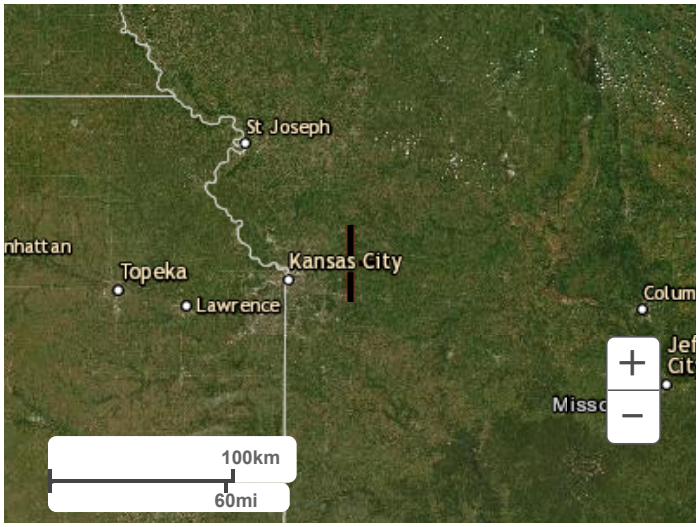
Large scale terrain



Large scale map



Large scale aerial



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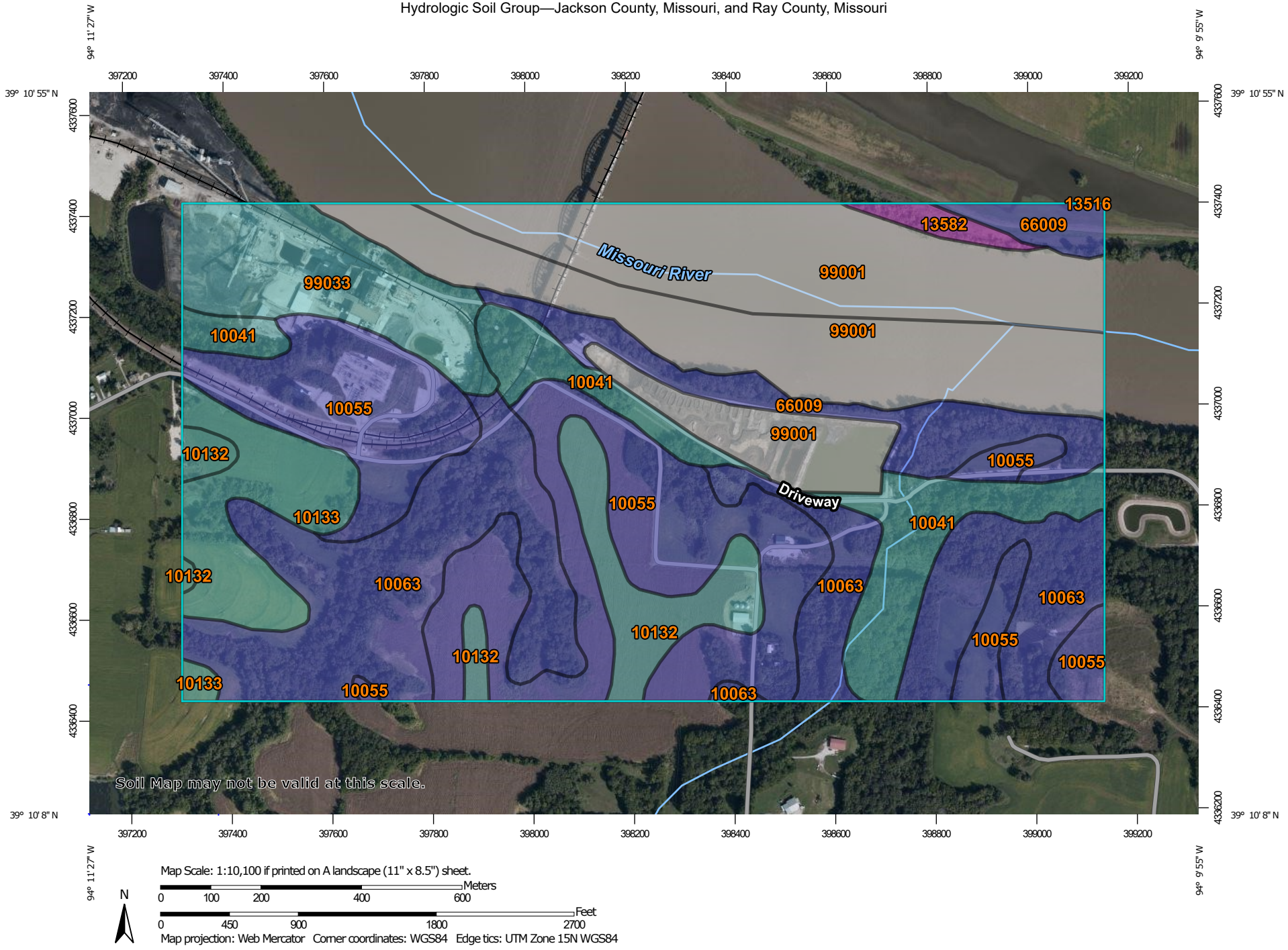
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

B.2 NRCS Web Soil Survey Map



Map Scale: 1:10,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1800 2700

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 22, May 29, 2020

Soil Survey Area: Ray County, Missouri
Survey Area Data: Version 20, May 29, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 6, 2019—Nov 16, 2019

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10041	Knox silt loam, 14 to 20 percent slopes, eroded	C	34.8	7.8%
10055	Knox silt loam, 5 to 9 percent slopes, eroded	B	99.7	22.2%
10063	Knox silty clay loam, 9 to 14 percent slopes, severely eroded	B	89.7	20.0%
10132	Sibley silt loam, 2 to 5 percent slopes	C	21.6	4.8%
10133	Sibley silt loam, 5 to 9 percent slopes	C	24.4	5.4%
66009	Haynie silt loam, 0 to 2 percent slopes, occasionally flooded	B	21.0	4.7%
99001	Water		65.6	14.6%
99033	Udarents-Urban land complex, 2 to 9 percent slopes	C	30.3	6.7%
Subtotals for Soil Survey Area			**387.1**	**86.2%**
Totals for Area of Interest			**449.0**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13516	Gilliam silt loam, 0 to 2 percent slopes, occasionally flooded	C/D	0.0	0.0%
13582	Sarpy loamy fine sand, 0 to 2 percent slopes, occasionally flooded	A	3.5	0.8%
66009	Haynie silt loam, 0 to 2 percent slopes, occasionally flooded	B	5.6	1.2%
99001	Water		52.9	11.8%
Subtotals for Soil Survey Area			**61.9**	**13.8%**
Totals for Area of Interest			**449.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

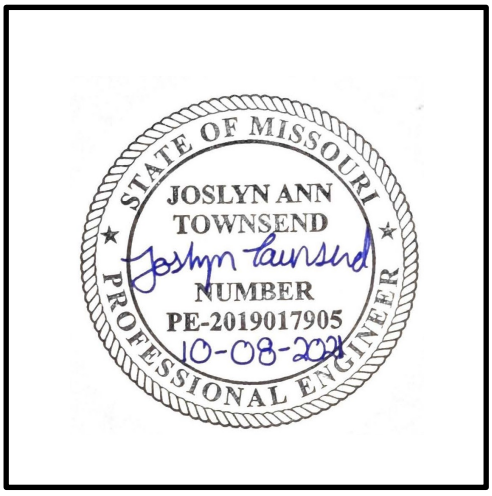
Tie-break Rule: Higher

B.3 Hydrologic Parameter Calculations

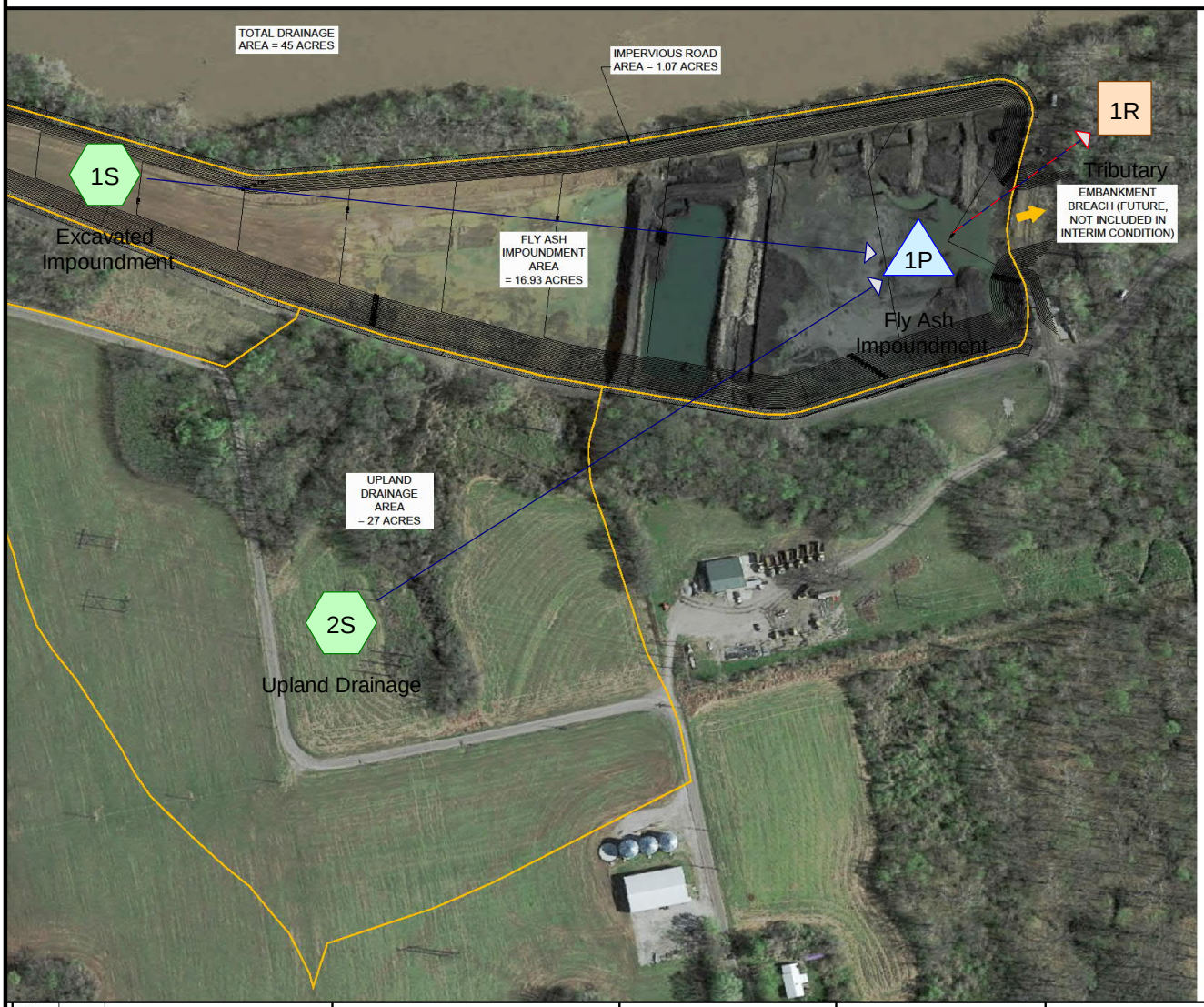
I, Joslyn Townsend, being a Registered Professional Engineer in good standing in the State of Missouri, do hereby certify that the following calculations, which include all pages in Appendix B.3, were made to satisfy the requirements specified in 40 CFR §257.82 and were prepared by me or under my direct personal supervision.

Joslyn Townsend
Printed Name

October 8, 2021
Date



AECOM
2380 McGee Street, Suite 200
Kansas City, Missouri 64108
1-816-561-4443



REV. NO.	BY	DATE	REVISIONS DESCRIPTION

AECOM
2380 McGee Street, Suite 200
Kansas City, Missouri 64108

EVERGY METRO
SIBLEY GENERATING
SIBLEY, MISS

WATERSHED AR

Subcat Reach Pond Link

Routing Diagram for Evergy Sibley H&H Certification
Prepared by AECOM, Printed 9/30/2021
HydroCAD® 10.10-6a s/n 00538 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100yr,24hr	Type II 24-hr		Default	24.00	1	8.98	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.930	74	>75% Grass cover, Good, HSG C (1S)
1.070	96	Gravel surface, HSG C (1S)
1.500	92	Paved roads w/open ditches, 50% imp, HSG C (2S)
18.500	85	Row crops, straight row, Good, HSG C (2S)
7.000	70	Woods, Good, HSG C (2S)
45.000	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
45.000	HSG C	1S, 2S
0.000	HSG D	
0.000	Other	
45.000		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	16.930	0.000	0.000	16.930	>75% Grass cover, Good	1S
0.000	0.000	1.070	0.000	0.000	1.070	Gravel surface	1S
0.000	0.000	1.500	0.000	0.000	1.500	Paved roads w/open ditches, 50% imp	2S
0.000	0.000	18.500	0.000	0.000	18.500	Row crops, straight row, Good	2S
0.000	0.000	7.000	0.000	0.000	7.000	Woods, Good	2S
0.000	**0.000**	**45.000**	**0.000**	**0.000**	**45.000**	**TOTAL AREA**	

Time span=0.00-300.00 hrs, dt=0.01 hrs, 30001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Excavated Impoundment Runoff Area=18.000 ac 0.00% Impervious Runoff Depth=5.93"
Flow Length=2,215' Tc=7.5 min CN=75 Runoff=175.81 cfs 8.901 af

Subcatchment 2S: Upland Drainage Runoff Area=27.000 ac 2.78% Impervious Runoff Depth=6.79"
Flow Length=1,543' Tc=19.8 min CN=82 Runoff=200.17 cfs 15.288 af

Reach 1R: Tributary Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.053 L=100.0' S=0.1800 '/' Capacity=1,060.75 cfs Outflow=0.00 cfs 0.000 af

Pond 1P: Fly Ash Impoundment Peak Elev=708.80' Storage=24.298 af Inflow=322.11 cfs 24.189 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 45.000 ac Runoff Volume = 24.189 af Average Runoff Depth = 6.45"
98.33% Pervious = 44.250 ac 1.67% Impervious = 0.750 ac

Summary for Subcatchment 1S: Excavated Impoundment

Tc values were calculated using AutoCAD measurement tools to find the cross sectional area of divided portions of the former fly ash impoundment (Q1-4, Road Flow, and Slope into the impoundment).

CN values were estimated based on known surface type of impoundment and surrounding area

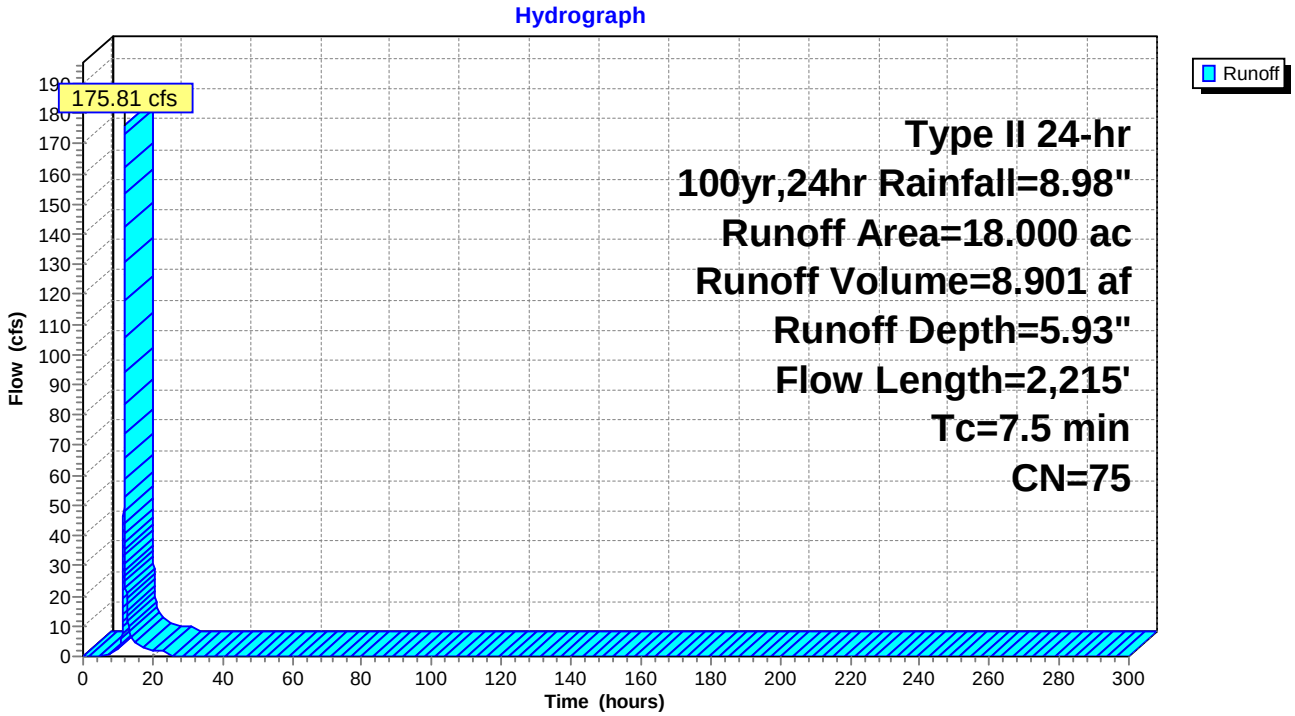
Runoff = 175.81 cfs @ 11.99 hrs, Volume= 8.901 af, Depth= 5.93"
Routed to Pond 1P : Fly Ash Impoundment

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr,24hr Rainfall=8.98"

Area (ac)	CN	Description
1.070	96	Gravel surface, HSG C
16.930	74	>75% Grass cover, Good, HSG C
18.000	75	Weighted Average
18.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	23	0.0200	1.09		**Sheet Flow, Road Flow**
					Smooth surfaces n= 0.011 P2= 3.62"
0.2	37	0.3480	3.76		**Sheet Flow, Into Impoundment**
					Smooth surfaces n= 0.011 P2= 3.62"
0.4	134	0.0050	5.57	3,399.81	**Channel Flow, Q1 Impoundment Base**
					Area= 610.6 sf Perim= 485.1' r= 1.26' n= 0.022
2.7	557	0.0050	3.40	2,809.34	**Channel Flow, Q2 Impoundment Base**
					Area= 826.2 sf Perim= 1,375.4' r= 0.60' n= 0.022
3.0	999	0.0050	5.62	19,490.22	**Channel Flow, Q3 Impoundment Base**
					Area= 3,468.7 sf Perim= 2,718.4' r= 1.28' n= 0.022
0.8	465	0.0050	10.03	59,651.03	**Channel Flow, Q4 Impoundment Base**
					Area= 5,945.7 sf Perim= 1,953.0' r= 3.04' n= 0.022
7.5	2,215	Total			

Subcatchment 1S: Excavated Impoundment



Summary for Subcatchment 2S: Upland Drainage

Area was found using Survey data and contour lines in AutoCad to determine the range in which water will flow into the impoundment.

Tc was found using Survey data and contour lines in AutoCAD to find the flow path and elevation changes within this drainage area.

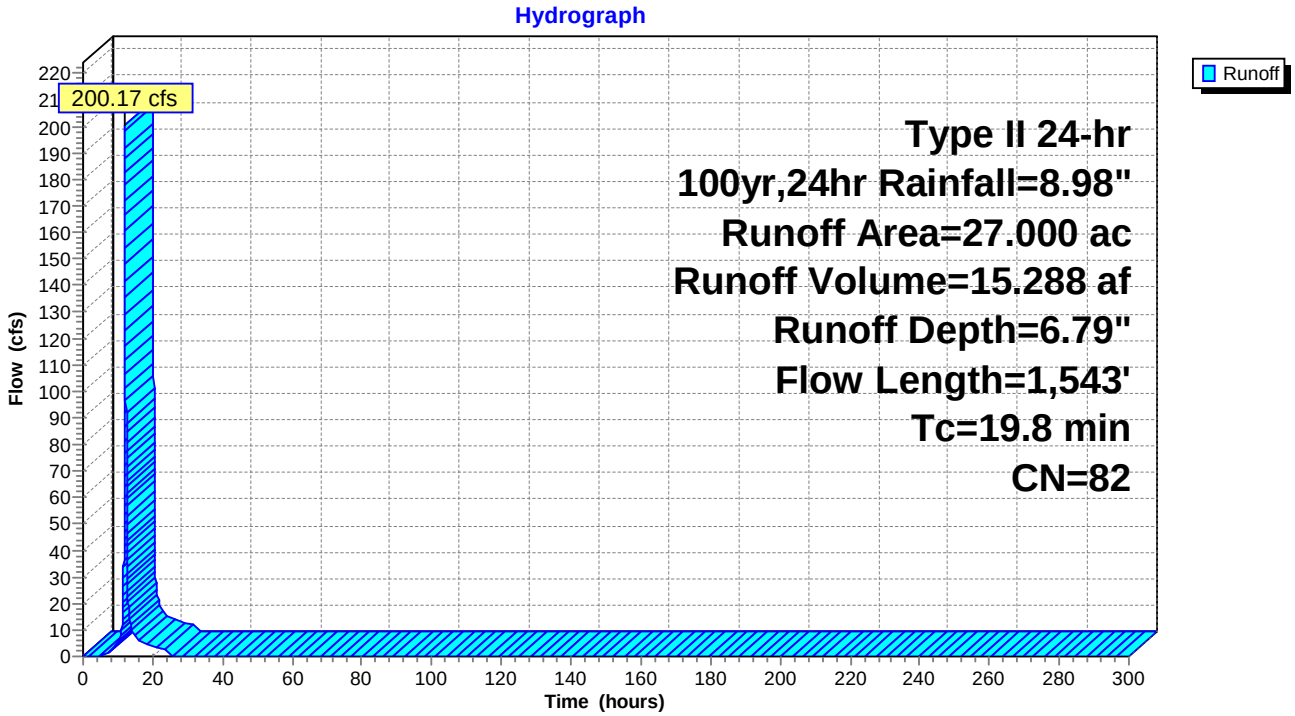
Runoff = 200.17 cfs @ 12.12 hrs, Volume= 15.288 af, Depth= 6.79"
Routed to Pond 1P : Fly Ash Impoundment

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs
Type II 24-hr 100yr,24hr Rainfall=8.98"

Area (ac)	CN	Description
1.500	92	Paved roads w/open ditches, 50% imp, HSG C
7.000	70	Woods, Good, HSG C
18.500	85	Row crops, straight row, Good, HSG C
27.000	82	Weighted Average
26.250		97.22% Pervious Area
0.750		2.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	768	0.0180	1.21		**Shallow Concentrated Flow, Straight Row Crops**
					Cultivated Straight Rows Kv= 9.0 fps
0.3	24	0.0410	1.47		**Sheet Flow, Road**
					Smooth surfaces n= 0.011 P2= 3.62"
8.9	751	0.0785	1.40		**Shallow Concentrated Flow, Woods**
					Woodland Kv= 5.0 fps
19.8	1,543	Total			

Subcatchment 2S: Upland Drainage



Summary for Reach 1R: Tributary

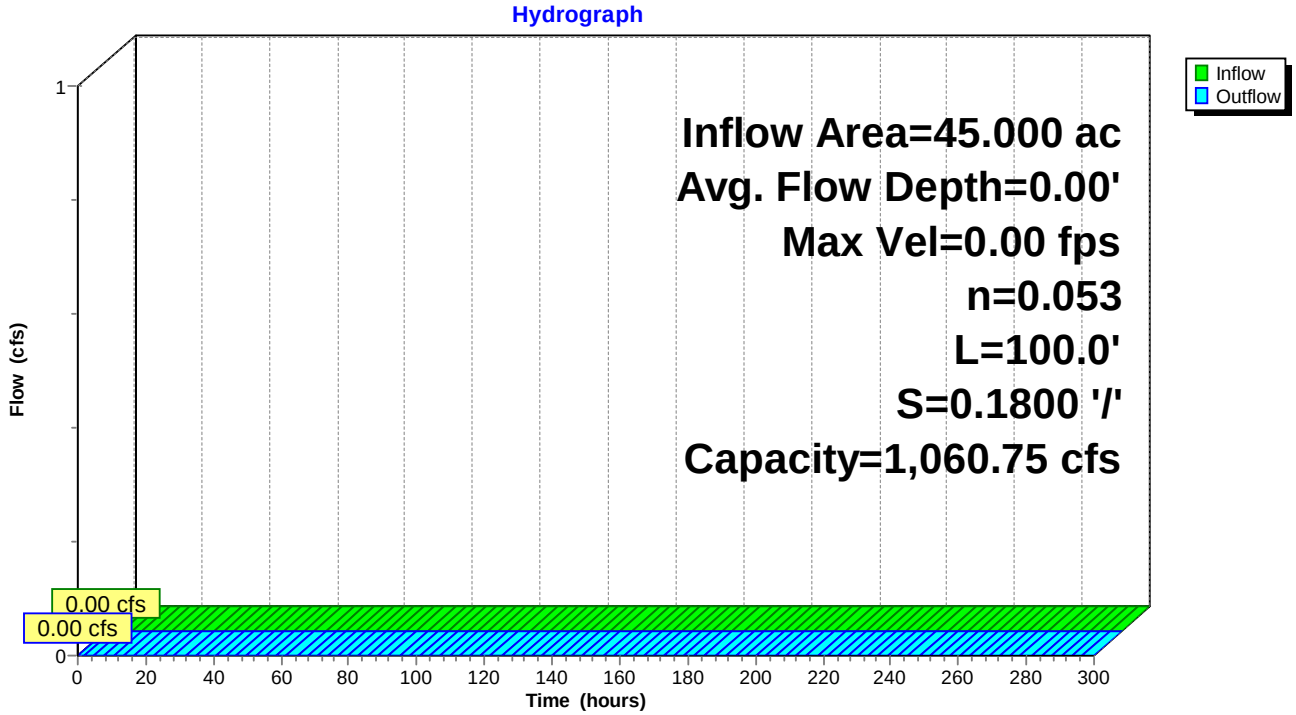
Inflow Area = 45.000 ac, 1.67% Impervious, Inflow Depth = 0.00" for 100yr,24hr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

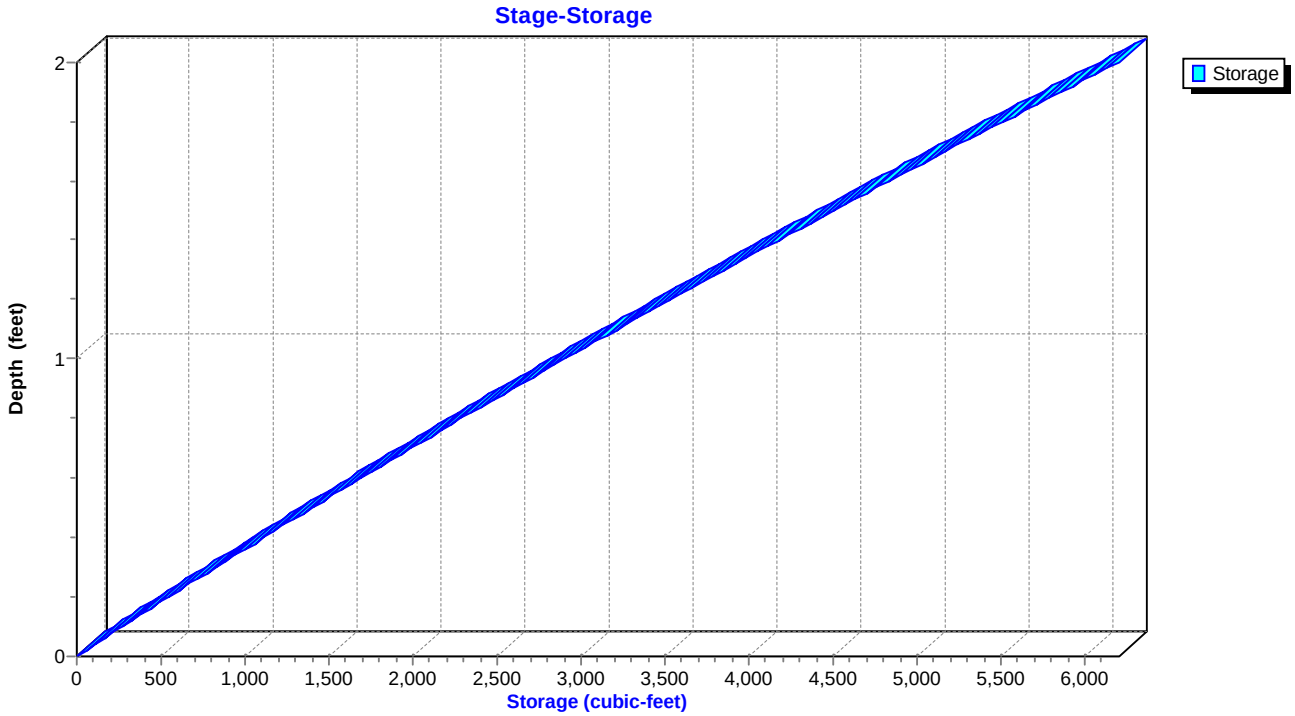
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 62.0 sf, Capacity= 1,060.75 cfs

27.00' x 2.00' deep channel, n= 0.053
Side Slope Z-value= 2.0 '/' Top Width= 35.00'
Length= 100.0' Slope= 0.1800 '/'
Inlet Invert= 720.00', Outlet Invert= 702.00'

Reach 1R: Tributary



Reach 1R: Tributary



Summary for Pond 1P: Fly Ash Impoundment

Storage volumes were collected from AutoCAD cut and fill calculations. Volume calcs were held to 719m elevation due to North side peak elevation being 719m and South side being 729m.

Outlet elevations were determined based on the B&Md .dwg files. The temporary rock check dam dimensions are specified on S-CG048. At a 706m elevation.

Inflow Area = 45.000 ac, 1.67% Impervious, Inflow Depth = 6.45" for 100yr,24hr event
Inflow = 322.11 cfs @ 12.02 hrs, Volume= 24.189 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R : Tributary
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R : Tributary

Routing by Dyn-Stor-Ind method, Time Span= 0.00-300.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 704.10' Storage= 0.109 af
Peak Elev= 708.80' @ 25.13 hrs Storage= 24.298 af (24.189 af above start)
Flood Elev= 720.00' Storage= 161.160 af (161.051 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	161.160 af	**Storage of Impoundment** Listed below

Elevation (feet)	Cum.Store (acre-feet)
704.00	0.000
705.00	1.094
706.00	4.267
707.00	9.733
708.00	17.131
709.00	26.112
710.00	40.853
711.00	47.774
712.00	59.924
713.00	72.825
714.00	86.431
715.00	100.650
716.00	115.243
717.00	130.178
718.00	145.466
719.00	161.160

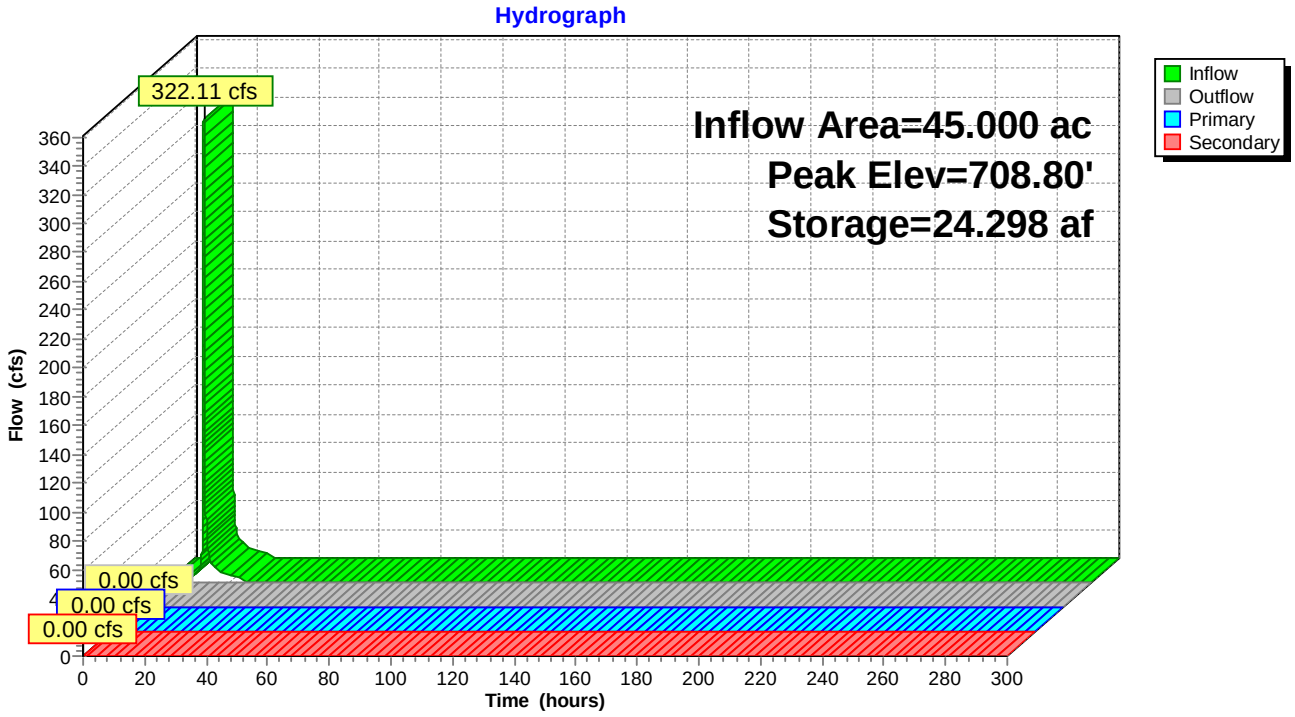
Device	Routing	Invert	Outlet Devices
#1	Primary	720.00'	**Low Point of Eastern Embankment, Cv= 2.62 (C= 3.28)**
			Head (feet) 1.00 1.50
			Width (feet) 100.00 100.00

#2 Secondary 720.00' **North Embankmet, Low Point in Saddle Dike**
using Reach 1R: Tributary

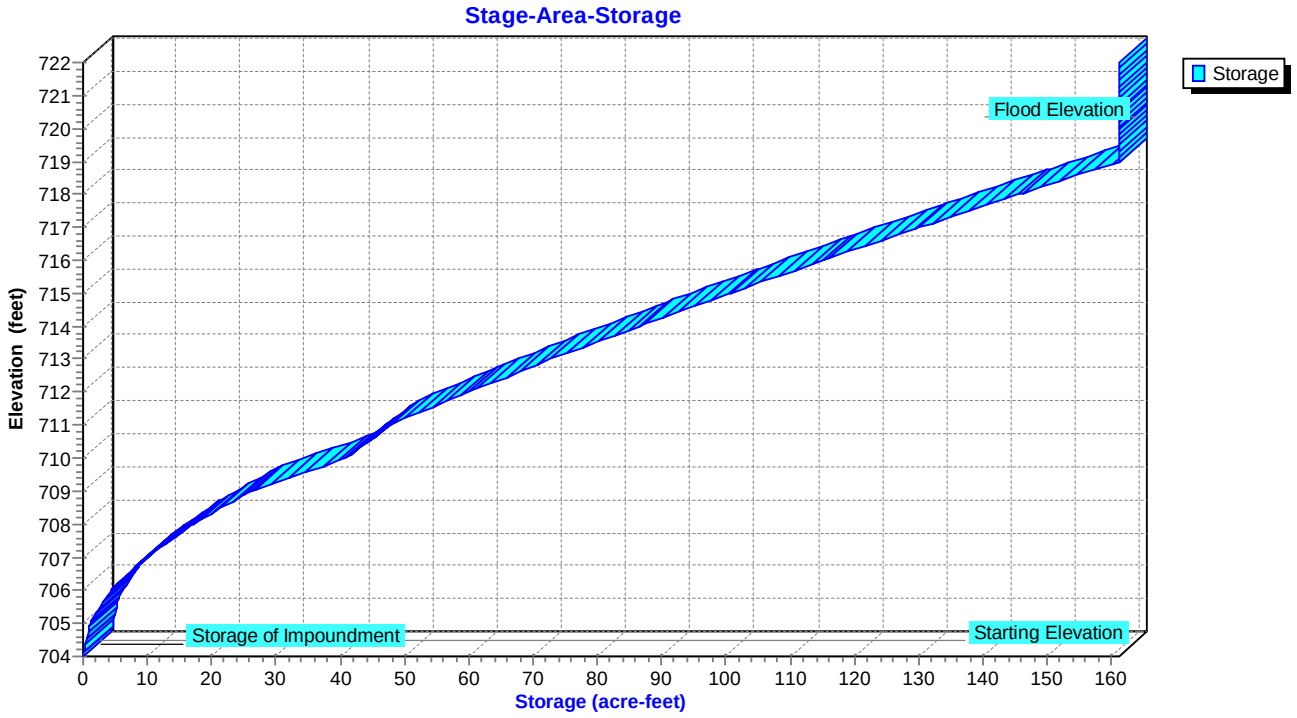
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=704.10' TW=720.00' (Dynamic Tailwater)
└**1=Low Point of Eastern Embankment** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=704.10' TW=720.00' (Dynamic Tailwater)
└**2=North Embankmet, Low Point in Saddle Dike** (Channel Controls 0.00 cfs)

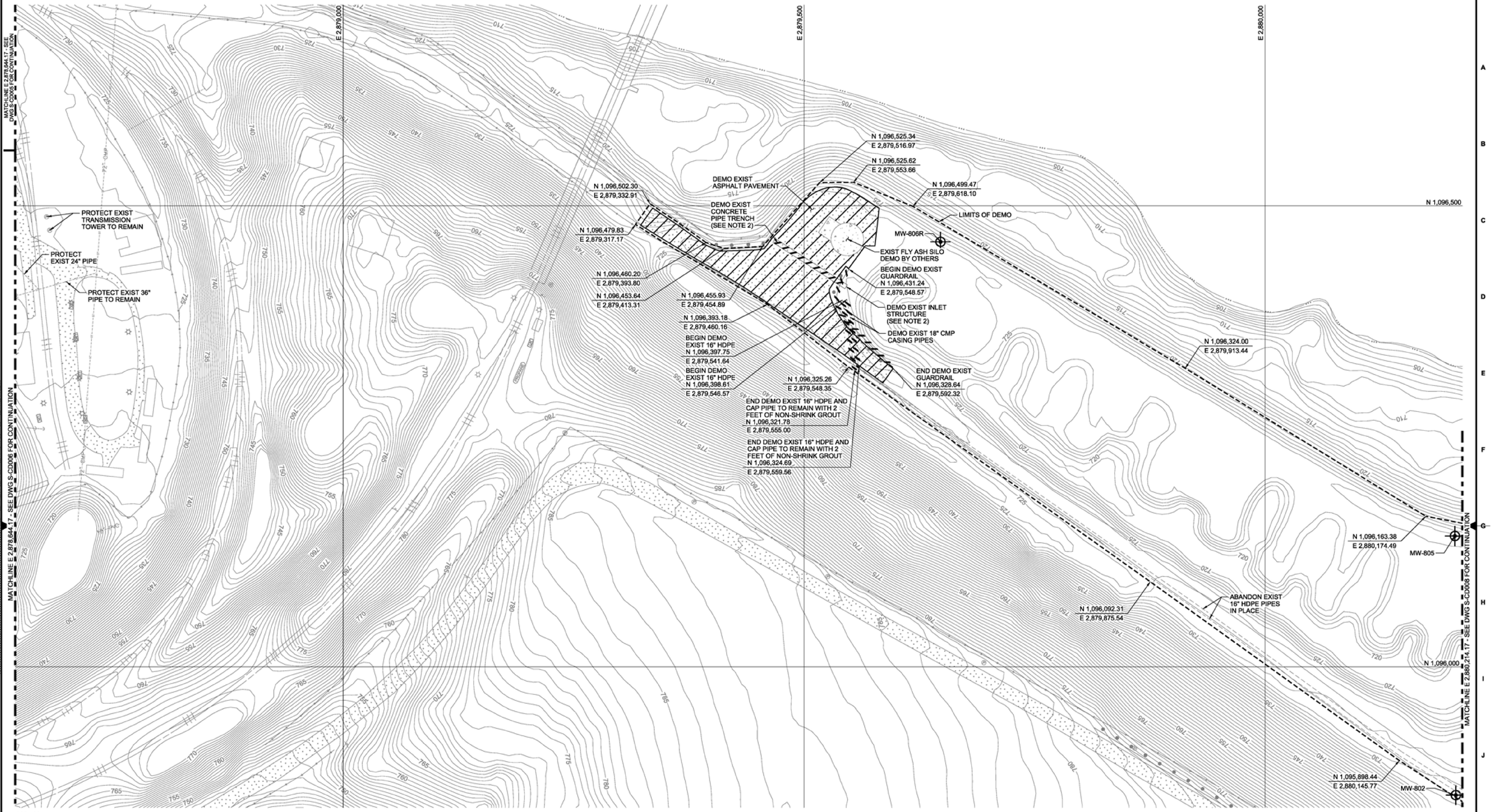
Pond 1P: Fly Ash Impoundment



Pond 1P: Fly Ash Impoundment



B.4 Burns & McDonnell Construction Drawings



NOTES:

1. CONTRACTOR SHALL REMOVE ALL STRUCTURES WITHIN LIMITS OF DEMO PRIOR TO COMPLETION OF WORK UNLESS NOTED OTHERWISE. EXISTING SURFACING TO REMAIN UNLESS NOTED OTHERWISE.
2. SEE REFERENCE DWGS Y3 AND Y13 FOR ADDITIONAL DETAILS ON EXIST CONCRETE PIPE TRENCH AND INLET STRUCTURE.

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2009010096
PROFESSIONAL ENGINEER

Wylam, Kira
Nov 27 2019 10:57 AM

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	05/15/19	KJE	KEW	INITIAL ISSUE

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165

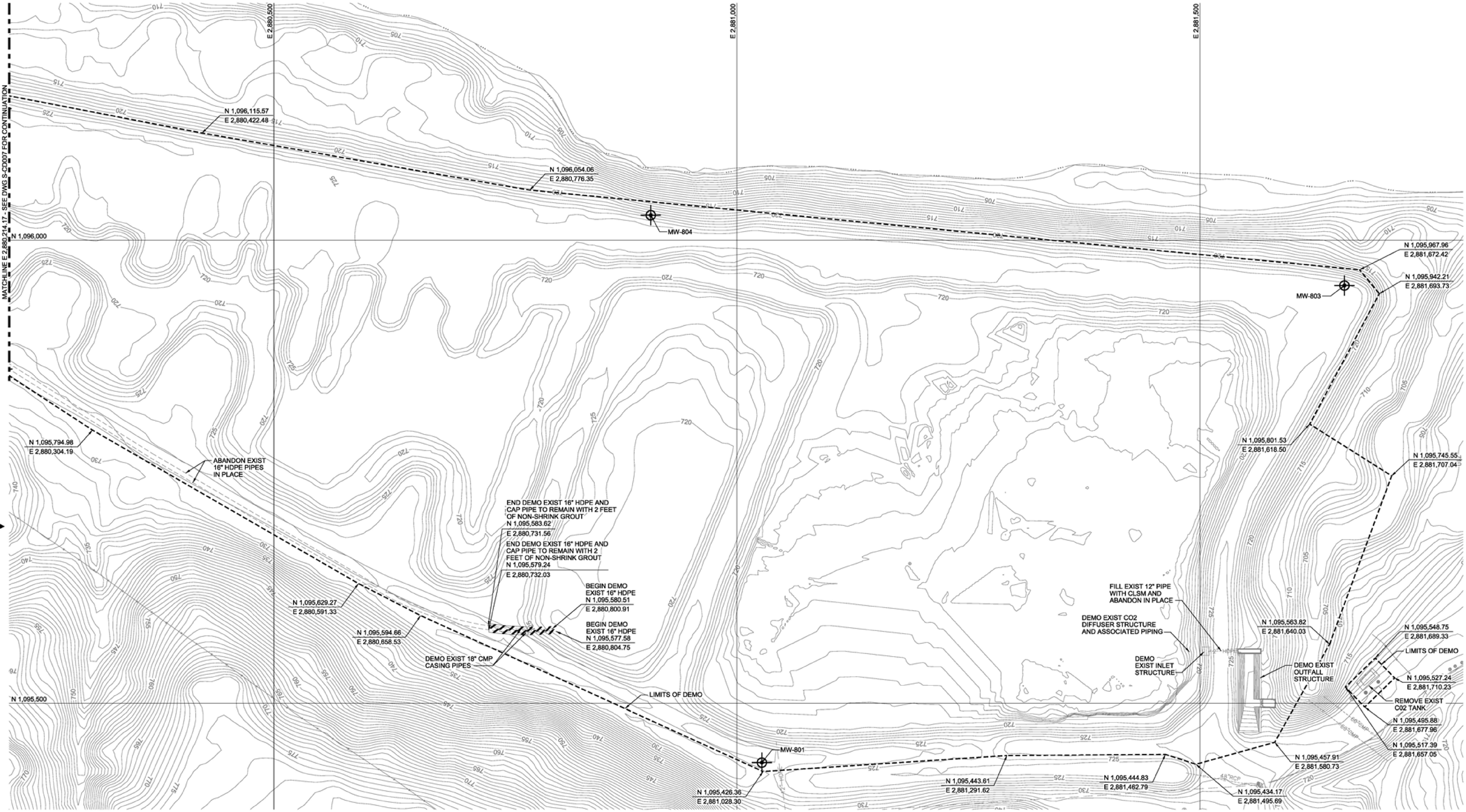
designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
DEMOLITION PLAN
SHEET 7

project 103871 | contract -
drawing S-CD007 – | rev. 1
sheet | of | sheets
file 103871-S-CD007.DGN

Millimeters
Scale For Microfilming
Inches



NOTES:

1. CONTRACTOR SHALL REMOVE ALL STRUCTURES WITHIN LIMITS OF DEMO PRIOR TO COMPLETION OF WORK UNLESS NOTED OTHERWISE. EXISTING SURFACING TO REMAIN UNLESS NOTED OTHERWISE.
2. SEE REFERENCE DWGS Y4, Y13, AND Y14 FOR ADDITIONAL DETAILS ON EXIST INLET STRUCTURE AND OUTFALL STRUCTURE.

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2009019909
PROFESSIONAL ENGINEER

Wylam, Kira
Nov 27 2019 10:57 AM

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	05/15/19	KJE	KEW	INITIAL ISSUE

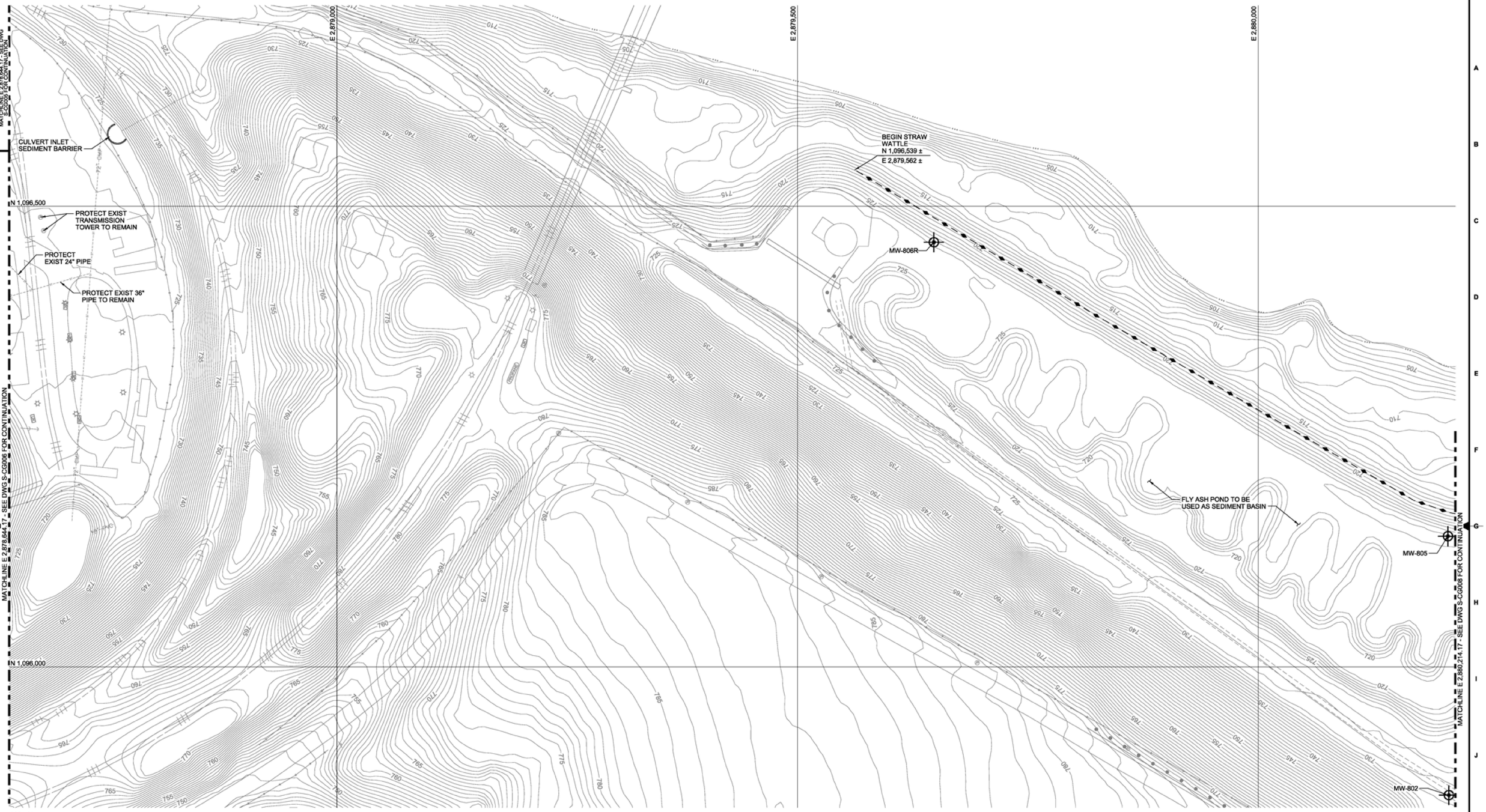
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165

designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
DEMOLITION PLAN
SHEET 6

project 103871 | contract -
drawing S-CD008 – rev. 1
sheet of sheets
file 103871-S-CD008.DGN



NOTES:

1. SEE DWG S-CG081 FOR EROSION CONTROL DETAILS.
2. CONTRACTOR SHALL MODIFY EROSION AND SEDIMENT CONTROL MEASURES AS NEEDED TO COMPLETE THE WORK AND STILL MEET EXISTING DISCHARGE LIMITS FOR ACTIVE NPDES OUTFALLS AND COMPLY WITH THE PROJECT SWPPP.

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2009019968
PROFESSIONAL ENGINEER
Wylam, Kira
Nov 27 2019 10:59 AM

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	06/21/19	KJE	KEW	ISSUED FOR BID

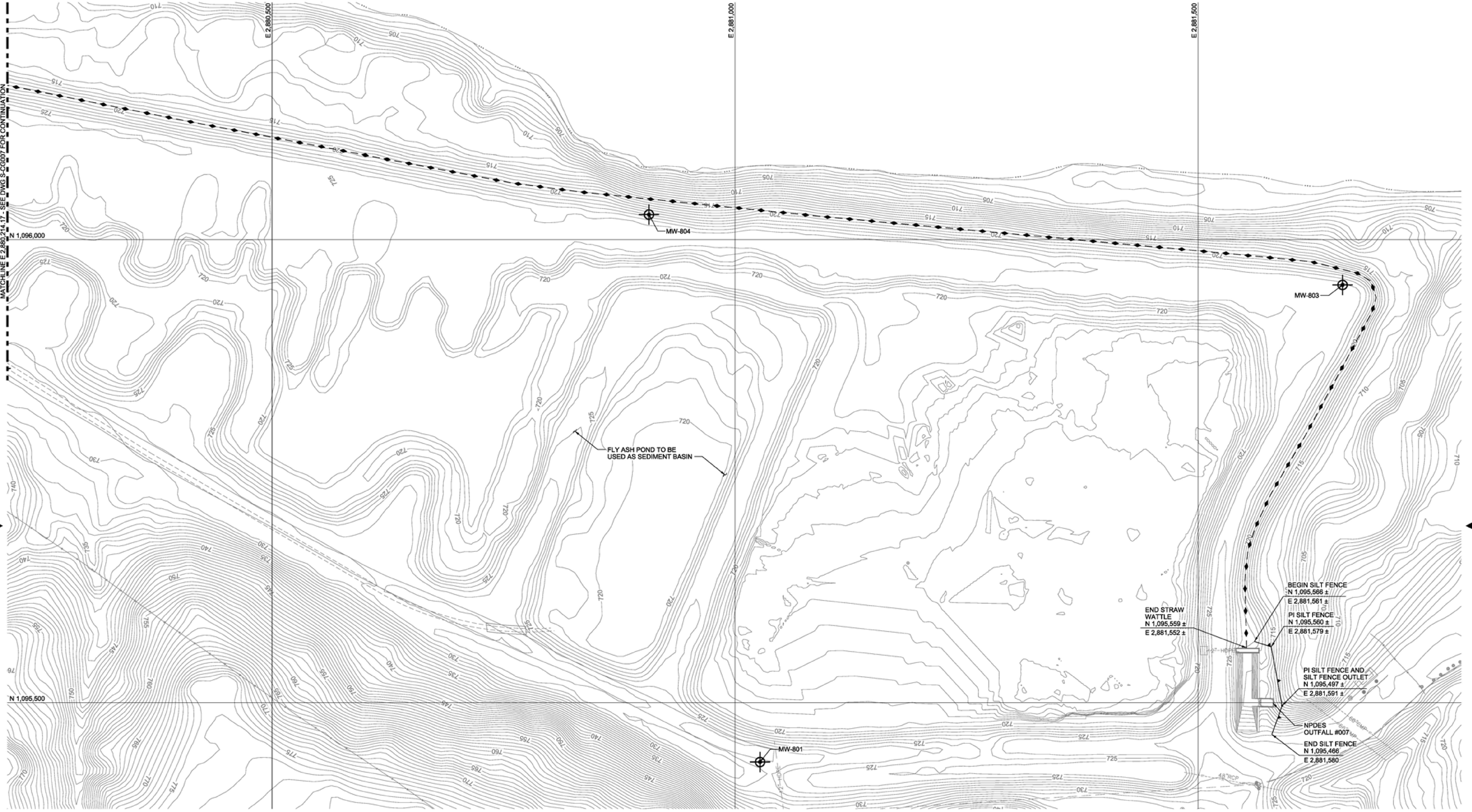
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165
designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
EROSION & SEDIMENT CONTROL PLAN
SHEET 7

project 103871 | contract -
drawing **S-CG007 –** | rev. **1**
sheet of sheets
file 103871-S-CG007.DGN

Scale For Microfilming
Millimeters
Inches



NOTES:

1. SEE DWG S-CG081 FOR EROSION CONTROL DETAILS.
2. CONTRACTOR SHALL MODIFY EROSION AND SEDIMENT CONTROL MEASURES AS NEEDED TO COMPLETE THE WORK AND STILL MEET EXISTING DISCHARGE LIMITS FOR ACTIVE NPDES OUTFALLS AND COMPLY WITH THE PROJECT SWPPP.

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2009019909
PROFESSIONAL ENGINEER

Wylam, Kira
Nov 27 2019 10:59 AM

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	06/21/19	KJE	KEW	ISSUED FOR BID

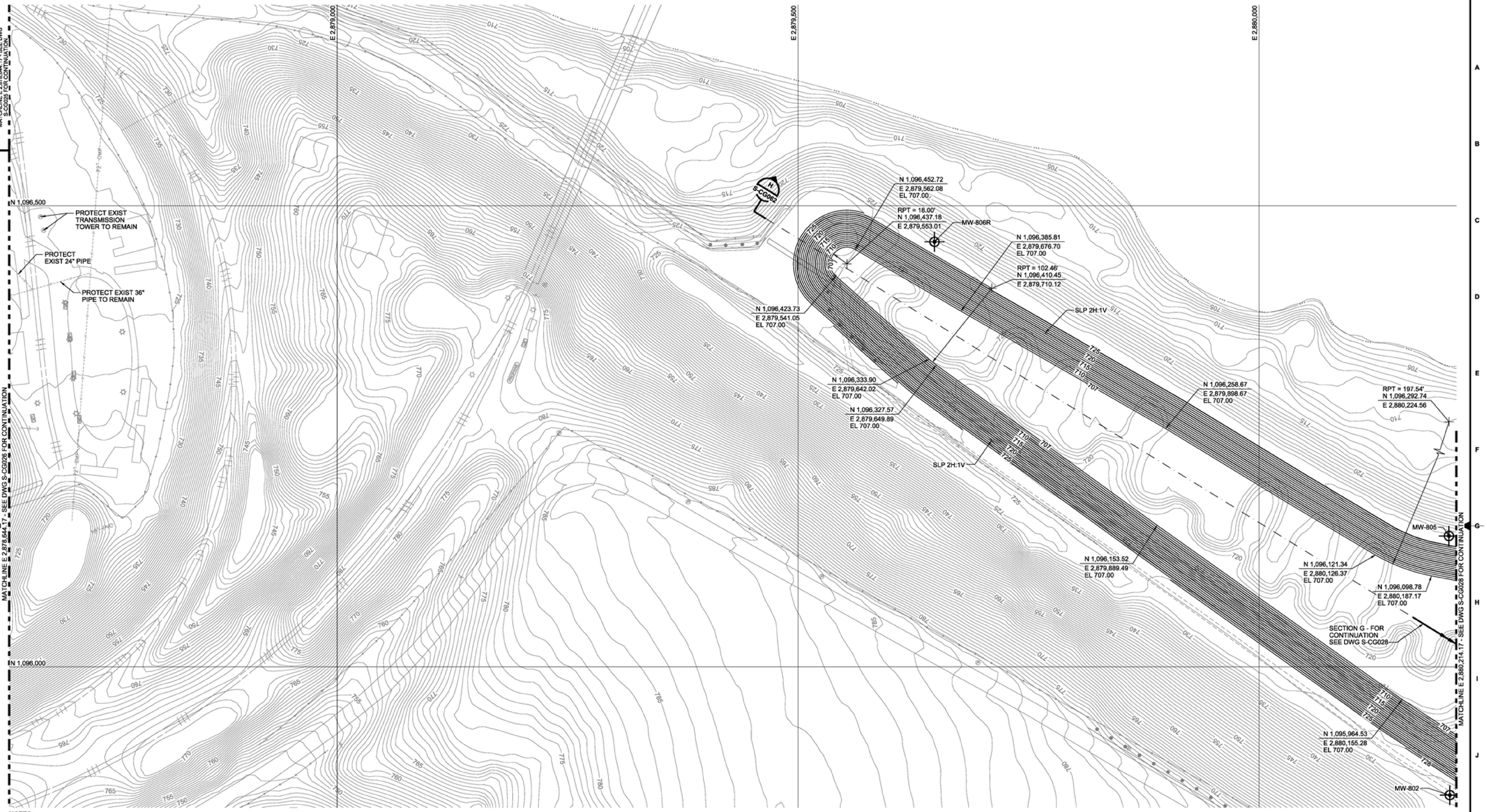
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165
designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
EROSION & SEDIMENT CONTROL PLAN
SHEET 6

project 103871 | contract -
drawing S-CG008 – rev. 1
sheet of sheets
file 103871-S-CG008.DGN

Scale For Microfilming
Millimeters
Inches



NOTES:

1. BOTTOM OF EXCAVATION MAY VARY FROM THAT INDICATED ON THIS DRAWING. CONTRACTOR TO OBTAIN WRITTEN AUTHORIZATION FROM OWNER BEFORE EXCAVATING ANY ADDITIONAL MATERIAL OR PROCEEDING WITH GRADING WORK.
2. POND BOTTOM TO BE SLOPED THROUGHOUT EXCAVATION TO SINGLE LOW POINT FOR STORMWATER MANAGEMENT.

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER
PE-2010009948
PROFESSIONAL ENGINEER

Wylam, Kira
Nov 27 2019 10:59 AM

Scale For Microfilming
Millimeters
Inches

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	05/15/19	KJE	KEW	INITIAL ISSUE

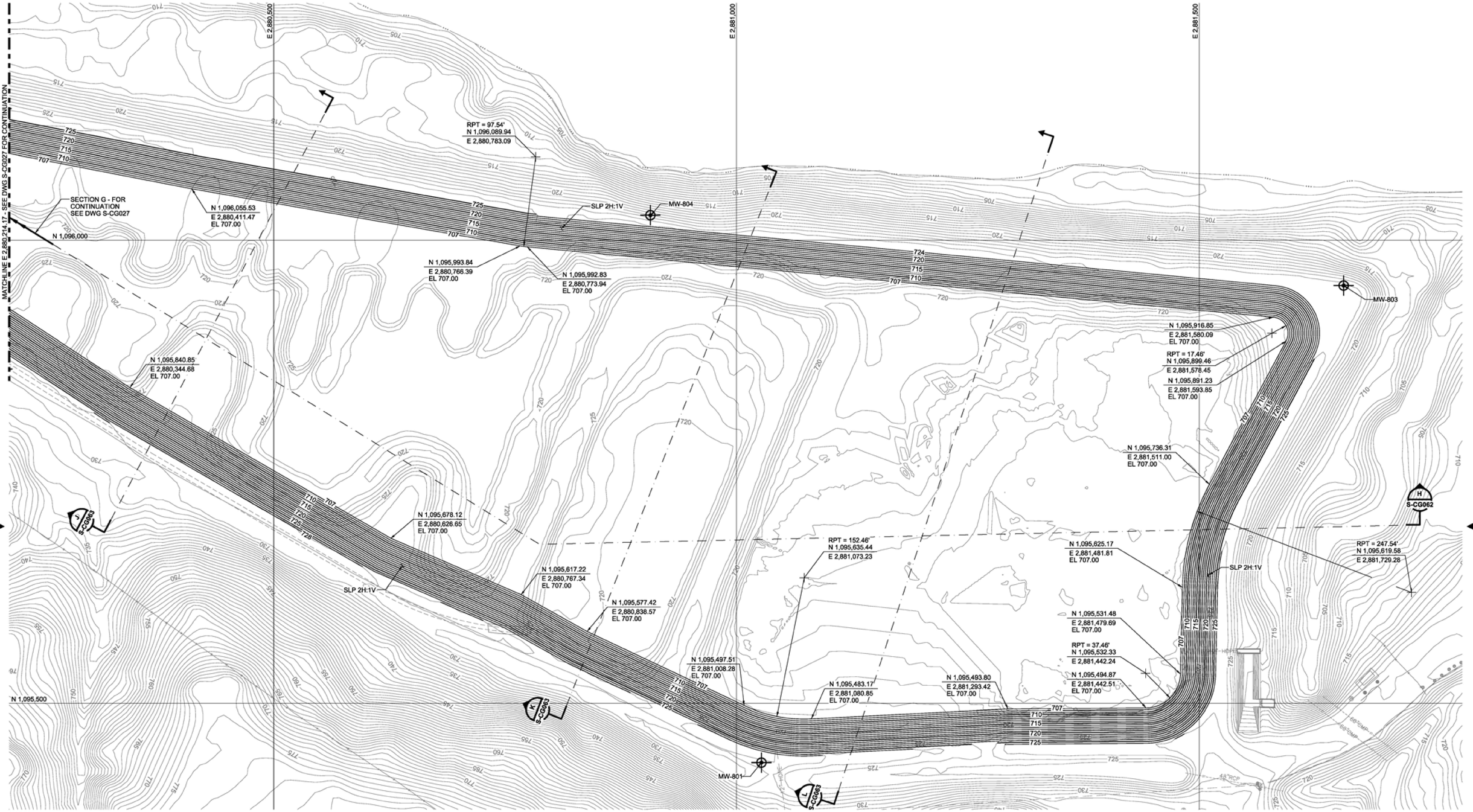
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165

designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
OVEREXCAVATION PLAN
SHEET 7

project 103871 | contract -
drawing S-CG027 — rev. 1
sheet of sheets
file 103871-S-CG027.DGN



NOTES:

1. BOTTOM OF EXCAVATION MAY VARY FROM THAT INDICATED ON THIS DRAWING. CONTRACTOR TO OBTAIN WRITTEN AUTHORIZATION FROM OWNER BEFORE EXCAVATING ANY ADDITIONAL MATERIAL OR PROCEEDING WITH GRADING WORK.
2. POND BOTTOM TO BE SLOPED THROUGHOUT EXCAVATION TO SINGLE LOW POINT FOR STORMWATER MANAGEMENT.

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2010009909
PROFESSIONAL ENGINEER

Wylam, Kira
Nov 27 2019 10:59 AM

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	05/15/19	KJE	KEW	INITIAL ISSUE

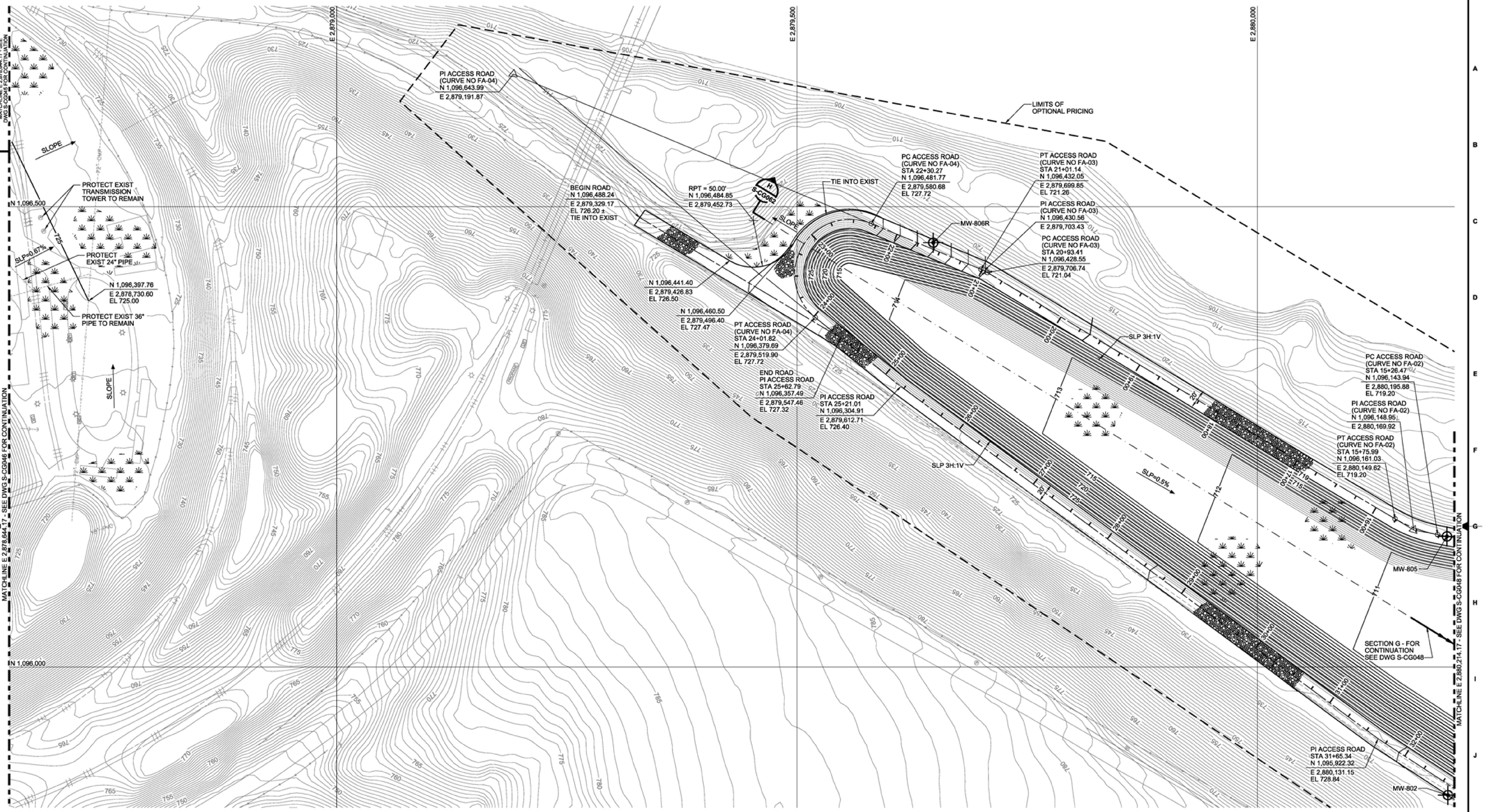
BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165
designed K. ENGHOLM
detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
OVEREXCAVATION PLAN
SHEET 8

project 103871 | contract -
drawing S-CG028 — rev. 1
sheet of sheets
file 103871-S-CG028.DGN

Scale For Microfilming
Millimeters
Inches



NOTES:

1. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES (INCLUDING WORK AREAS BY OTHERS) SHALL RECEIVE FINAL SURFACING. AREAS NOT SHOWN TO BE SURFACED SHALL RECEIVE TOPSOIL AND SEED AS SPECIFIED.
2. CONTRACTOR SHALL INSTALL EROSION-CONTROL FABRIC AS SPECIFIED ON ALL SLOPES 3H:1V OR STEEPER AND IN ALL GRASS LINED DITCHES. SEE DWG S-CG082 FOR TYPICAL EROSION-CONTROL FABRIC INSTALLATION.
3. CONTRACTOR SHALL BENCH EMBANKMENTS INTO EXISTING SLOPES PER BENCHING DETAIL ON DWG S-CG083.

CURVE DATA	CURVE DATA	CURVE DATA
CURVE NO FA-02	CURVE NO FA-03	CURVE NO FA-04
Δ = 18° 47' 47"	Δ = 8° 31' 45"	Δ = 163° 47' 16"
D = 37° 48' 34"	D = 114° 35' 30"	D = 95° 29' 35"
R = 151.54'	R = 50.00'	R = 60.00'
T = 25.08'	T = 3.73'	T = 421.26'
L = 49.71'	L = 7.44'	L = 171.52'

NORTH

0 40' 80'
SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2010010908
PROFESSIONAL ENGINEER
Wylam, Kira
Nov 27 2019 11:00 AM

no.	date	by	ckd	description
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	05/15/19	KJE	KEW	INITIAL ISSUE

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165

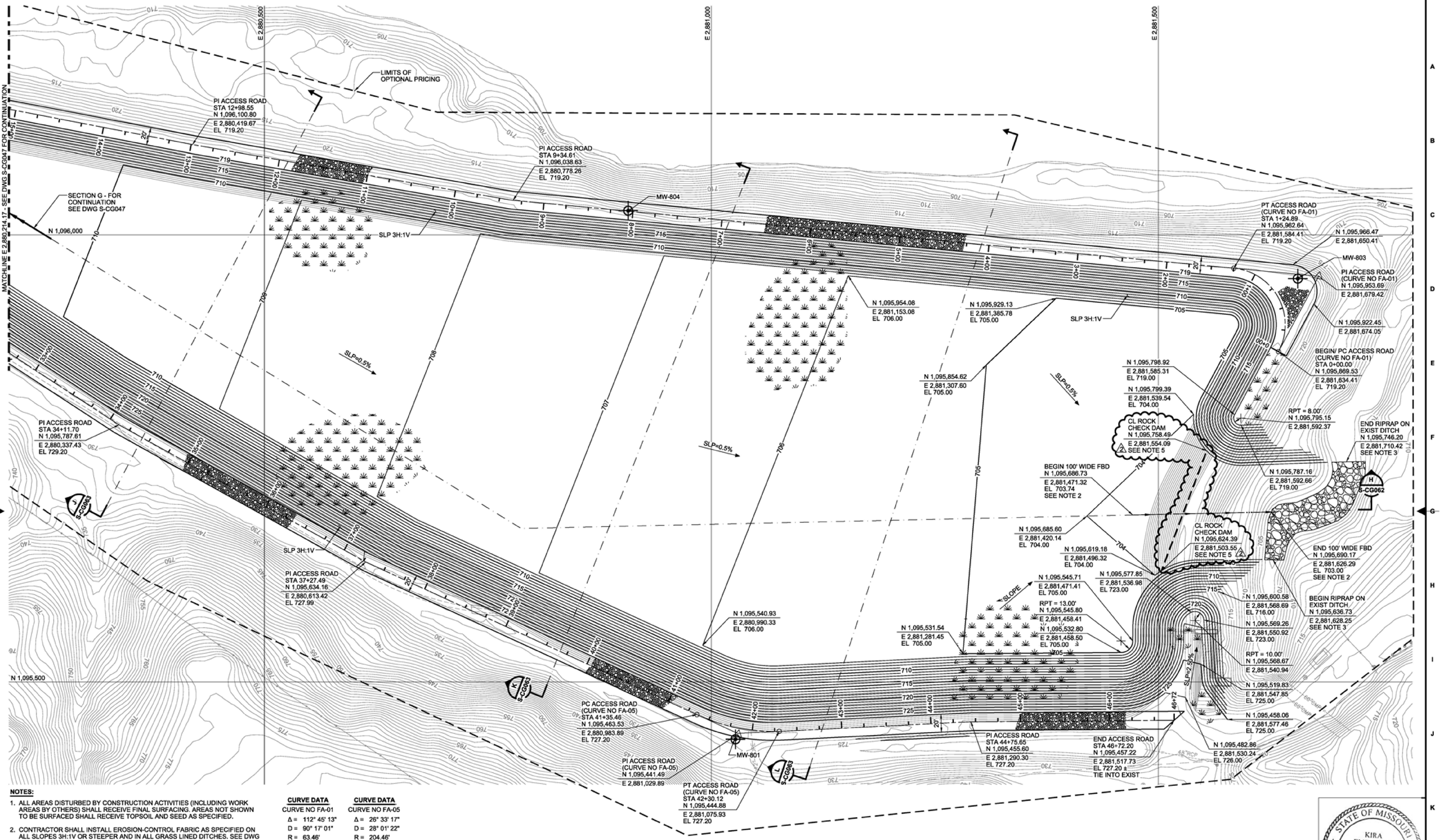
designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life
SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
GRADING PLAN
SHEET 7

project 103871 | contract -
drawing S-CG047 — rev. 1
sheet of sheets
file 103871-S-CG047.DGN

Millimeters
Inches
Scale For Mylar/Bluline



NOTES:

1. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES (INCLUDING WORK AREAS BY OTHERS) SHALL RECEIVE FINAL SURFACING. AREAS NOT SHOWN TO BE SURFACED SHALL RECEIVE TOPSOIL AND SEED AS SPECIFIED.
2. CONTRACTOR SHALL INSTALL EROSION-CONTROL FABRIC AS SPECIFIED ON ALL SLOPES 3H:1V OR STEEPER AND IN ALL GRASS LINED DITCHES. SEE DWG S-CG082 FOR TYPICAL EROSION-CONTROL FABRIC INSTALLATION.
3. CONTRACTOR SHALL LINE EXISTING DITCH WITH 16 OZ/SY GEOTEXTILE AND RIPRAP. RIPRAP SECTION SHALL BE 18" THICK AND EXTEND UP SIDE SLOPES A MINIMUM OF 2' VERTICALLY. CONTRACTOR SHALL OVEREXCVATE AS NEED TO MAINTAIN FLOWLINE OF EXISTING DITCH.
4. CONTRACTOR SHALL BENCH EMBANKMENTS INTO EXISTING SLOPES PER BENCHING DETAIL ON DWG S-CG083.
5. ROCK CHECK DAM SHALL HAVE A HEIGHT OF 18" AND 2H:1V SIDE SLOPES. ROCK CHECK DAM SHALL BE KNOCKED DOWN OR REMOVED WHEN FINAL VEGETATION IS ESTABLISHED.

CURVE DATA	CURVE DATA
CURVE NO FA-01	CURVE NO FA-05
Δ = 112° 45' 13"	Δ = 26° 33' 17"
D = 90° 17' 01"	D = 28° 01' 22"
R = 63.46'	R = 204.46'
T = 95.43'	T = 48.25'
L = 124.89'	L = 94.76'

NORTH

0 40' 80'

SCALE IN FEET

ISSUED FOR CONSTRUCTION

STATE OF MISSOURI
KIRA ELIZABETH WYLAM
NUMBER PE-2009019000
PROFESSIONAL ENGINEER
Jul 19 2021 9:44 AM

no.	date	by	ckd	description
2	07/19/21	KJE	KEW	ADDED ROCK CHECK DAM
1	11/27/19	KJE	KEW	ISSUED FOR CONSTRUCTION
0	05/15/19	KJE	KEW	INITIAL ISSUE

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
Burns & McDonnell Engineering Co, Inc.
CERTIFICATE OF AUTHORITY NO. 000165

designed K. ENGHOLM | detailed S. NICHOLS

KCP&L energizing life

SIBLEY GENERATING STATION
JACKSON COUNTY, MO

IMPOUNDMENT CLOSURE AND SITE RESTORATION
GRADING PLAN
SHEET 8

project 103871 | contract -

drawing **S-CG048 —** rev. **2**

sheet of sheets

file 103871-S-CG048.DGN

Scale For Microfilming: Millimeters / Inches