PERIODIC INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

EXISTING CCR IMPOUNDMENTS

CCR Rule Section 257.82

ASBURY POWER PLANT

21133 Uphill Lane
Asbury, Missouri 64832

October 15, 2021

The Empire District Electric Company

Prepared by:

PALMERTON & PARRISH, INC.

10/15/21

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October 15, 2021

The Empire District Electric Company
Asbury Power Plant
21133 Uphill Lane
Asbury, Missouri 64832

RE: **Periodic Inflow Design Flood Control System Plan** –
CCR Rule Section 257.82
The Empire District Electric Company – Asbury Power Plant
Asbury, Missouri
PPI Project Number 231518

To Whom It May Concern:

This document presents the **Periodic Inflow Design Flood Control System Plan** for The Empire District Electric Company's CCR Impoundment at the Asbury Power Plant. This document has been prepared to meet the requirements of Section 257.82 of the CCR Rule.

In accordance with Section 257.105(g)(4), a copy of this document should be placed in The Empire District Electric Company's operating record. In accordance with Section 257.107(g)(4), this document should also be posted to The Empire District Electric Company's CCR Compliance website. Notification of the availability of this document should be provided to the State Director, as required in Section 257.106(g)(4).

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ASBURY, MISSOURI

1.0 INTRODUCTION

This Periodic Inflow Design Flood Control System Plan has been prepared according to the U. S. Environmental Protection Agency final rule regarding the disposal of coal combustion residuals from electric utilities (40 CFR Part 257 and 261, also known as the CCR Rule). The CCR Rule Section 257.82 requires the owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system according to the requirements of this Section.

This plan may be amended at any time provided the revised plan is placed in the facility's operating record as required by Section 257.105(g)(4). This plan must be amended whenever there is a substantial change in conditions or a minimum of every five (5) years.

The Asbury Power Plant maintains one CCR impoundment, the Asbury CCR Impoundment. See Figures 1 and 2 in Appendix I for the Asbury CCR Impoundment location on a topographic map and aerial photograph, respectively.

The Asbury CCR Impoundment is subdivided into three (3) Ponds, identified as the Lower Pond, Upper Pond, and South Pond. The Lower Pond, Upper Pond, and South Pond are separated by interior earthen embankments. The Upper Pond is further subdivided by an interior dike into Upper Pond A (North Cell of the Upper Pond) and Upper Pond B (South Cell of the Upper Pond). The Lower Pond is further subdivided by interior dikes into several sections. The sections of the Lower Pond are identified as Sections D through J for the purposes of this Report. See Figure 3 in Appendix I for a diagram showing each section located within the Asbury CCR Impoundment.

The following sections of this report assess the hydrologic and hydraulic capacity requirements for the Asbury CCR Impoundment.

2.0 ANALYSIS OF EXISTING INFLOW DESIGN FLOOD CONTROL SYSTEM

2.1 Hazard Classification and Design Assumptions

The Asbury CCR Impoundment is classified as a significant hazard potential CCR surface impoundment in accordance with Section 257.73(a)(2) of the CCR Rule. In accordance with Section 257.82(a), the inflow design flood control system must adequately manage flow for a 1,000-year flood.

Design assumptions for the hydrologic and hydraulic model include the following:

1. There is virtually no loss of water through the bottom of the impoundment. Additionally, all sections of the Impoundment and drainage areas outside of the impoundment are modeled as impervious (CN = 98), with the exception of Lower Pond Section J, which has a significant amount of area that is not subject to submersion. The area within Lower Pond Section J that is not subject to submersion was assigned a CN number of 78 for meadow in good condition with hydrologic soil group D. These assumptions are considered conservative.
2. The Asbury Power Plant was officially taken out of service on March 1, 2020. Water levels assumed for the purposes of this analysis are consistent with historic operating levels of the Asbury CCR Impoundment, and are conservative based upon recent field observations and survey data. The water levels used in the model for the Upper Pond A, Upper Pond B, and Lower Pond Section J are 952.5 feet, 953.6 feet, and 928.8 feet, respectively.
3. There is no process water that enters the Asbury CCR Impoundment.
4. The National Weather Service Precipitation Frequency Data Server was used to determine the 1000-year recurrence interval precipitation estimate for the site. The 1,000-year event for the durations of 6 hours, 12 hours, and 24 hours were evaluated. The 24-hour, 1,000-year recurrence interval precipitation event was determined to be the critical design event that produced the maximum peak discharge for the system. For the 24-hour duration the precipitation depth is estimated at 13.6 inches. A copy of the output from the National Weather Service Precipitation Frequency Data Server is included in Appendix II.

Figure 3 in Appendix I is a diagram showing each section located within the Asbury CCR Impoundment, the approximate location of the drainage area for each section, and flow routing.

2.2 Hydrologic and Hydraulic Model

The volumes of the individual basins located within the Asbury CCR Impoundment were estimated using a 1-foot topographic map of the impoundment. The topographic map was developed from a comprehensive topographic survey performed in 2012. The topographic survey was updated in 2014, 2016, and 2020. The August 2020 topographic survey update included surveying of areas in the Lower Pond where additional CCR had been placed.

See Figure 3 in Appendix I for a diagram showing each section located within the Asbury CCR Impoundment, the current topographic contours, the approximate location of the drainage area for each section, and flow routing. The following table provides the model input data used for each section.

Table 2.2-1: Asbury CCR Impoundment Model Input Data

Section	Drainage Area (Acres)	Receives Water From	Lowest Elevation on Dike	TR55 CN
Upper Pond A	4.94	NA	953.8	98
Upper Pond B	14.87	NA	954.4	93.42
South Pond (Section C)	12.40	NA	954.2	98
Lower Pond Section D	10.50	Upper Pond A	951.7	98
Lower Pond Section E	7.02	Section D	947.3	98
Lower Pond Section F	3.99	NA	952.8	98
Lower Pond Section G	4.39	NA	946.9	98
Lower Pond Section H	9.51	NA	947.5	98
Lower Pond Section I	12.19	NA	946.5	98
Lower Pond Section J	39.30	Upper Pond B	931.5	86.61

The U.S. Army Corps of Engineers HEC-1 and HEC-HMS software was used to model the flow of water through the connected sections within the impoundment and to estimate the ponding water level in isolated sections within the impoundment. The HEC models are designed to simulate the surface runoff response of a watershed to precipitation by representing the watershed as an interconnected system of hydrologic and hydraulic components. Rainfall over the Asbury CCR Impoundment was modeled using the SCS Unit Hydrograph method. The SCS Type II distribution and abstractions from rainfall were estimated using the NRCS Technical Release 55, Urban Hydrology for Small Watersheds. To be conservative, most of the drainage areas in the model were considered virtually impervious (CN = 98). The exception is Lower Pond Section J, which has a significant area that is not subject to submersion.

Five (5) different HEC models were developed based on the hydraulic connections within the Impoundment, which as summarized below.

1. **Upper Pond A, Lower Pond Section D, and Lower Pond Section E:** The drainage area for Upper Pond A also includes the coal pile drainage area. The initial water level in Upper Pond A is 952.5 feet. Water discharges from Upper Pond A into Lower Pond Section D from three (3) 10-inch pipes. The intake of two of these pipes is set at 952.16 feet and the intake of the third pipe is set at 953.0 feet. Flow through these three pipes was estimated using Manning's equation. Water in Lower Pond Section D discharges to Lower Pond Section E from two (2) 10-inch pipes passing through the separating dike. Flow through these two pipes was estimated using Manning's equation until the pipe inlets became submerged with 2.5 feet of water. With water 2.5 feet or higher over the pipe inlets, flow was

estimated using the Hazen Williams equation for flow under pressure. There are no external discharge spillways from Upper Pond A, Lower Section D, or Lower Pond Section E.

2. **South Pond (Section C):** This basin within the Impoundment was modeled independently because it is relatively isolated from the rest of the Impoundment, and primarily receives water through precipitation. There is no external discharge spillway on the perimeter levee embankment of the South Pond (Section C).

3. **Lower Pond Section F:** This basin within the Impoundment was modeled independently because it is relatively isolated from the rest of the Impoundment, and primarily receives water through precipitation. There are no external discharge spillways from Lower Pond Section F.

4. **Lower Pond Section G:** This basin within the Impoundment was modeled independently because it is relatively isolated from the rest of the Impoundment, and primarily receives water through precipitation. There are overflow pipes from Lower Pond Section G to Lower Pond Section J, but the ponding level in Lower Pond Section G does not reach the pipe inverts under the design flood. There is no external discharge spillway from Lower Pond Section G.

5. **Upper Pond B, Lower Pond Section H, Lower Pond Section I, and Lower Pond Section J:** The initial water level in Upper Pond B was modeled as 953.6 feet. Water discharges from Upper Pond B into Lower Pond Section J from one (1) 10-inch pipe. The intake of this pipe is set at approximately 953.0 feet. Flow through this pipe was estimated using Manning's equation.

   Lower Pond Sections H and I overflow into Lower Pond Section J through earthen channel spillways.

   The initial water level in Lower Pond Section J is 928.8 feet. Water from Section J is discharged at Outfall #002 through a primary spillway consisting of two (2) 12-inch pipes. The intake of these two (2) pipes is set at approximately 928.8 feet. Flow through these pipes was estimated using Manning's equation.

   Outfall #002 also has an auxiliary spillway consisting of a trapezoidal shaped concrete channel that is 24 feet wide and 1.2 feet from the bottom of the spillway to the top of the berm. The flowline of the auxiliary spillway is at elevation 930.35 feet. Flow over the auxiliary spillway was estimated using the equation for flow over an Ogee spillway.

2.3 Hydrologic and Hydraulic Modeling Results

Table 2.3-1 below summarizes the results of the modeled stormwater flooding event, including the resulting water elevation and freeboard in each basin.

Table 2.3-1: Asbury CCR Impoundment Model Output Data

Section	Result of 1000 Year Rainfall	Computed Water Elevation (ft.)	Freeboard (feet)
Upper Pond A	Flows into Section D	953.45	0.35
Upper Pond B	Flows into Section J	954.14	0.26
South Pond (Section C)	Contains Rainfall	952.39	1.81
Lower Pond Section D	Flows into Section E	951.41	0.29
Lower Pond Section E	Contains Rainfall	946.61	0.69
Lower Pond Section F	Contains Rainfall	950.46	2.34
Lower Pond Section G	Contains Rainfall	941.79[1]	5.11
Lower Pond Section H	Flows into Section J	947.43	0.07
Lower Pond Section I	Flows into Section J	946.47	0.03
Lower Pond Section J	Discharge to Outfall	931.31	0.19

[1]The computed water elevation for Section G includes 0.90 acre feet of water more than what was calculated in the HEC-1 model. This additional 0.90 acre-feet of water is the maximum daily discharge from the historic pumping of bottom ash sluice water. This is no longer occurring, but is conservative and does not impact the conclusions of this study at this time.

Lower Pond Section E, which is the end basin for flows from the coal pile, Upper Pond A, and Lower Pond Section D, contains the design flood with a freeboard of 0.69 feet below the lowest part of the exterior perimeter levee embankment.

South Pond (Section C) and Lower Pond Sections F, and G are relatively isolated from the other portions of the Impoundment and have sufficient storage volume to contain the precipitation within them without overflowing into an adjacent section. Freeboard in each of these basins is greater than one foot.

Lower Pond Sections H and I have significantly changed since the last update. These Sections will currently overflow into Lower Pond Section J during the design storm. Freeboard in Sections H and I have been reduced to 0.07 feet and 0.03 feet, respectively.

Lower Pond Section J, which is the end basin for flows from the Upper Pond B and Lower Pond Sections H and I, contains the design flood with a freeboard of 0.19 feet below the lowest part of the dike and 0.96 feet over the auxiliary spillway. Note that Lower Pond Section J was modeled with the two (2) outlet pipes open during the storm event.

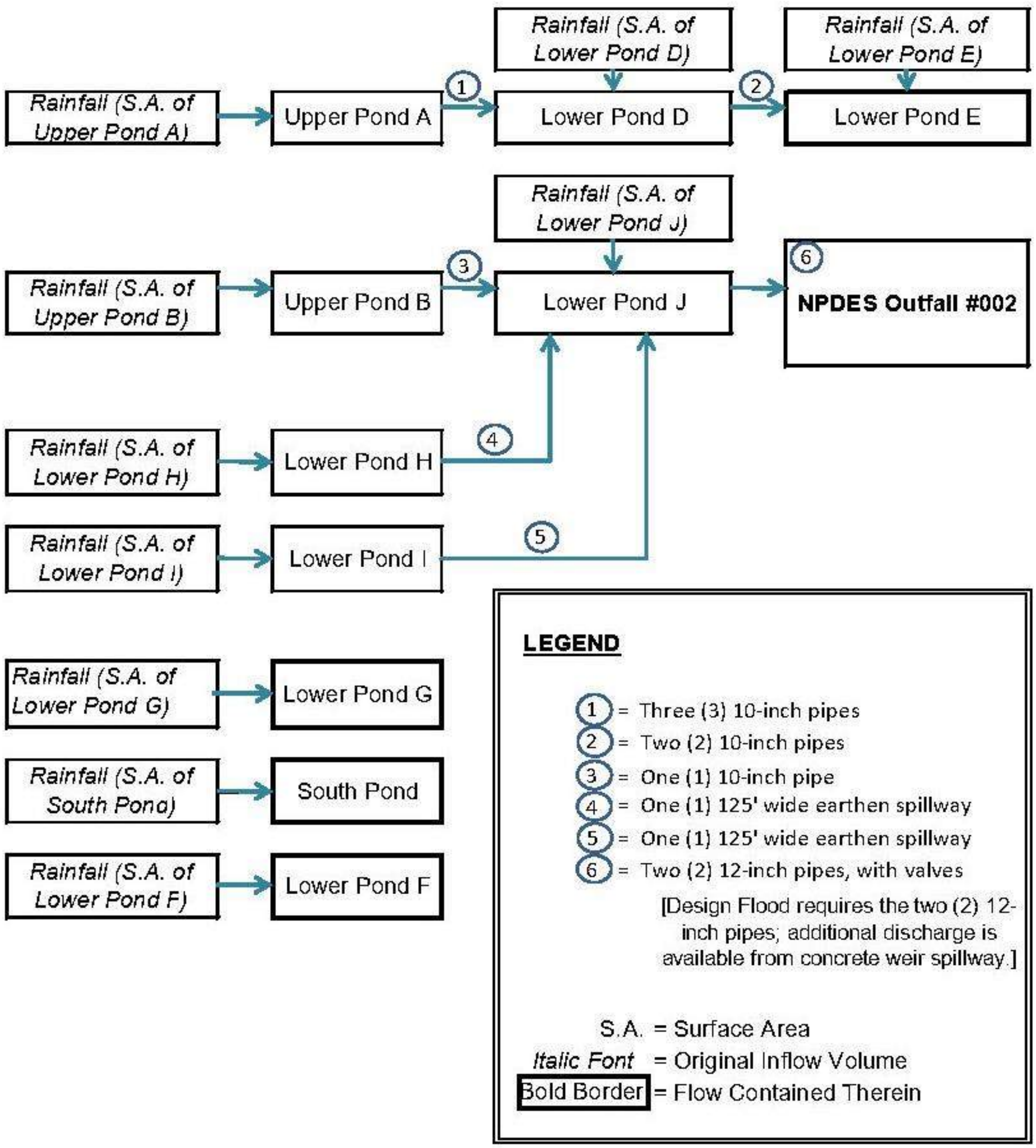
2.4 Conclusions

The Asbury CCR Impoundment is capable of adequately managing the Design Flood under existing conditions. The total capacity of the permitted discharge point, NPDES Outfall #002, exceeds what is necessary during the Design Flood event. In addition to the excess capacity of the spillway at NPDES Outfall #002, there is excess storm water storage capacity in several sections of the Impoundment. The Empire District Electric Company has several options available to convey excess storm water by gravity flow or pump excess storm water if necessary.

3.0 INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

The Empire District Electric Company's Inflow Design Flood Control Plan for the Asbury CCR Impoundment is summarized in the flow chart below. Under typical operating conditions, the Design Flood event is discharged through the two (2) 12-inch outlet pipes in Section J of the Lower Pond, at NPDES Discharge #002.

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN



3.1 Contingency Planning

The two (2) 12-inch outlet pipes are regularly observed by The Empire District Electric Company's staff to verify their functionality. In the event of unanticipated conditions, such as obstruction of one or more of these discharge pipes, or a storm event that exceeds the Design Flood event, The Empire District Electric Company can make several different operational adjustments for routing of additional storm water. Some of these operational adjustments are summarized in the list below.

As previously stated, the Asbury CCR Impoundment passes the Design Flood event under normal operating conditions. The options listed below are presented for contingency planning purposes only and are not explicitly incorporated into the Inflow Design Flood Control System Plan.

1. Additional storm water flow capacity is available from the auxiliary concrete spillway at NPDES Outfall #002, in Lower Pond Section J.

2. Additional storm water storage is available in the South Pond (Section C). Water can be conveyed to the South Pond from Upper Pond B by opening of one or both of the two (2) 12-inch pipes with valves between Upper Pond B and the South Pond.

4.0 CCR RULE SECTION 257.82(c)(5) – CERTIFICATION

The undersigned Professional Engineer certifies that the Inflow Design Flood Control System Plan meets the requirements of 40 CFR 257.82.

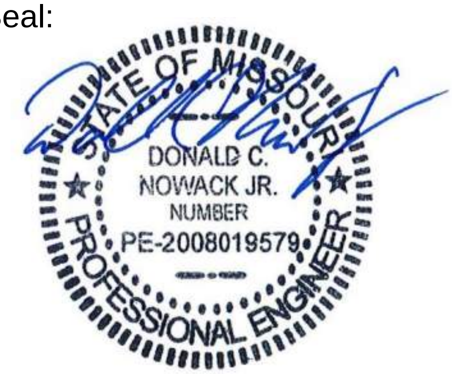
State of Missouri Professional Engineering License Number: 2008019579

Name: Donald C. Nowack, P.E.

Signature:

Date: October 15, 2021

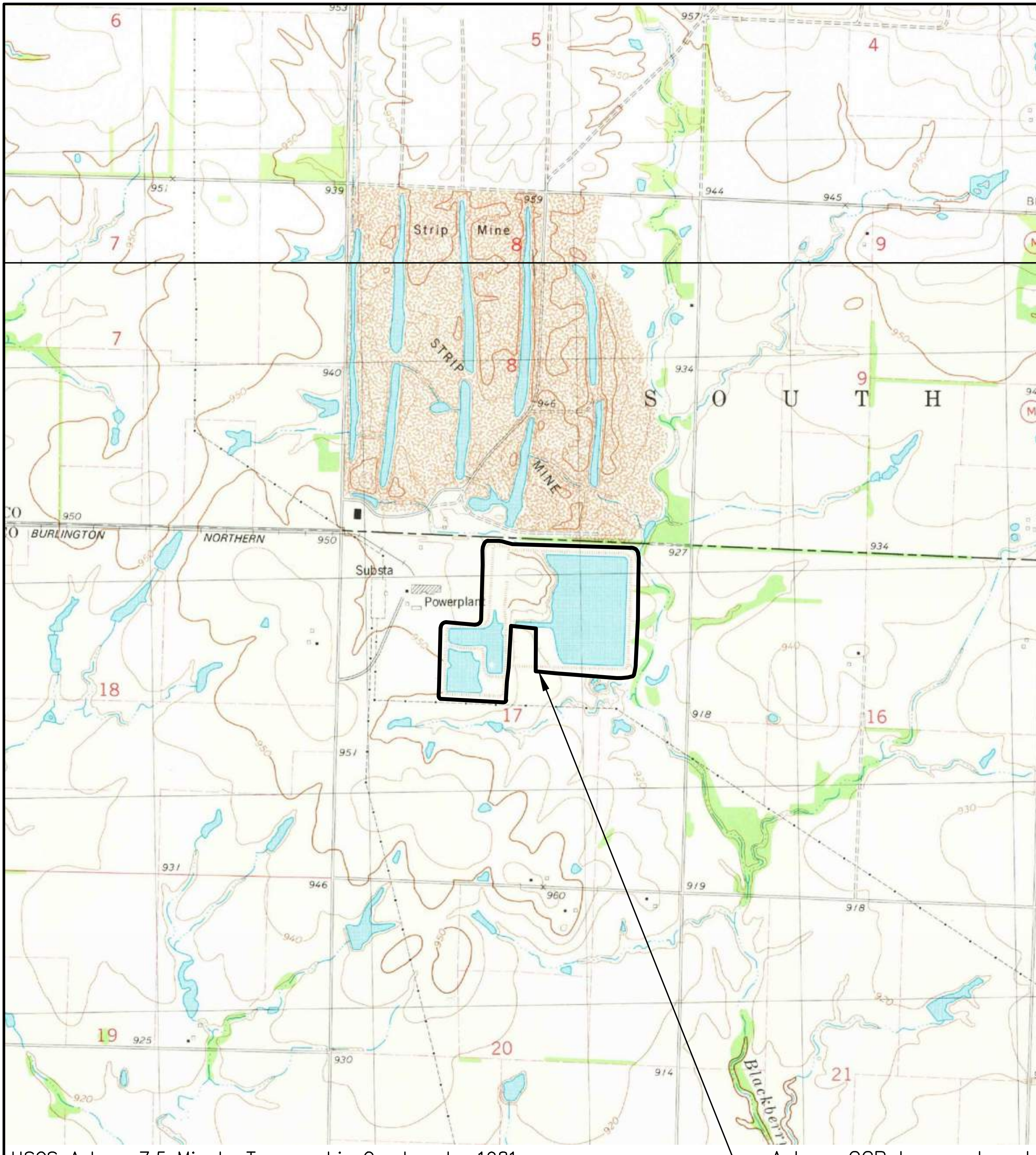
Seal:



10/15/21

APPENDIX I

FIGURES



USGS Asbury 7.5 Minute Topographic Quadrangle, 1981
USGS Mindenmines 7.5 Minute Topographic Quadrangle, 1981

SCALE
1"=2000'

Project: Asbury Power Plant, 21133 Uphill Lane, Asbury, MO
Client: Empire District Electric Company

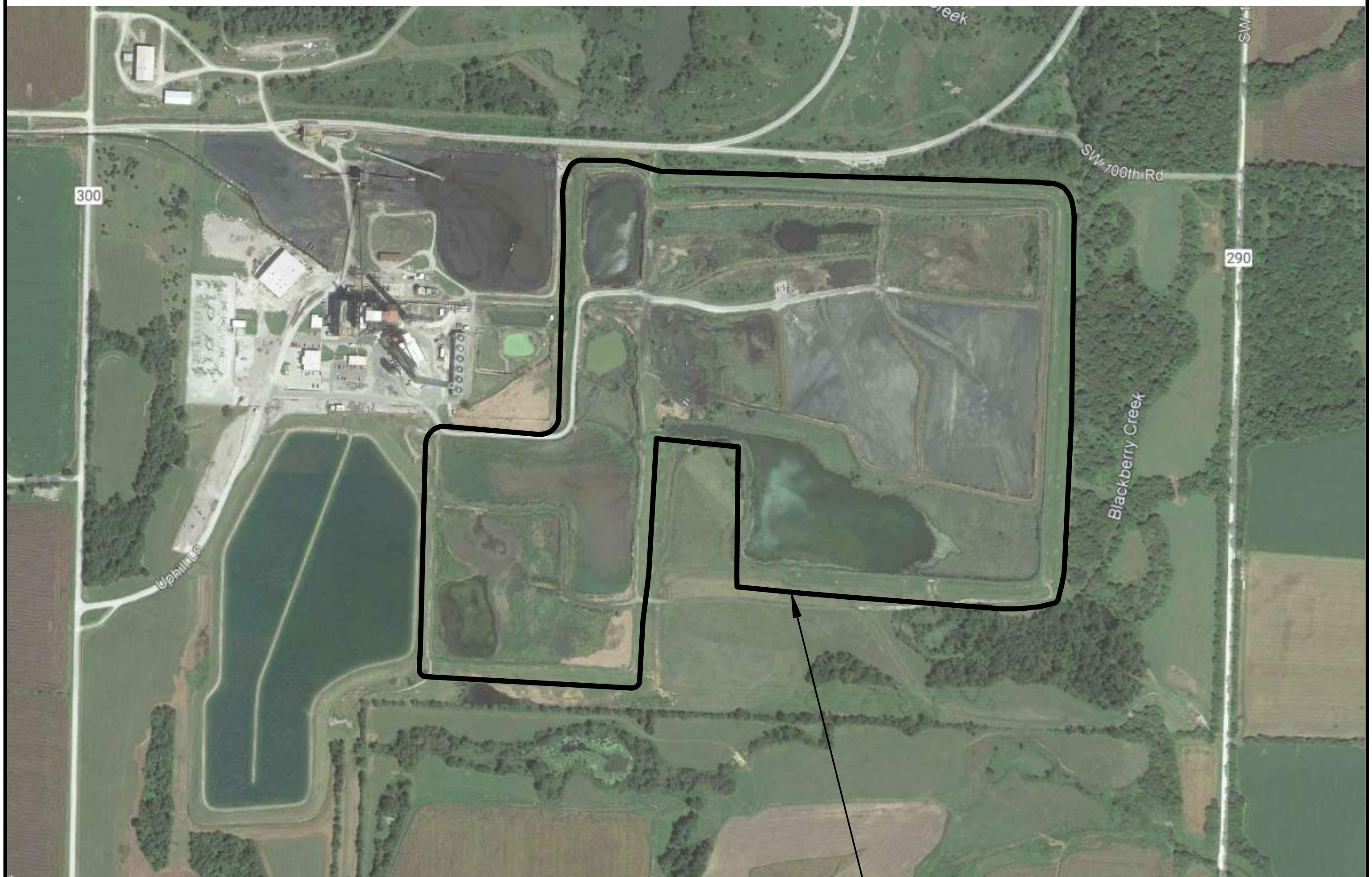
Site Location on Topographic Map

DATE: October 15, 2021

Project Number: 231518

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

FIGURE 1



SCALE
1"=800'

Project: Asbury Power Plant, 21133 Uphill Lane, Asbury, MO
Client: Empire District Electric Company

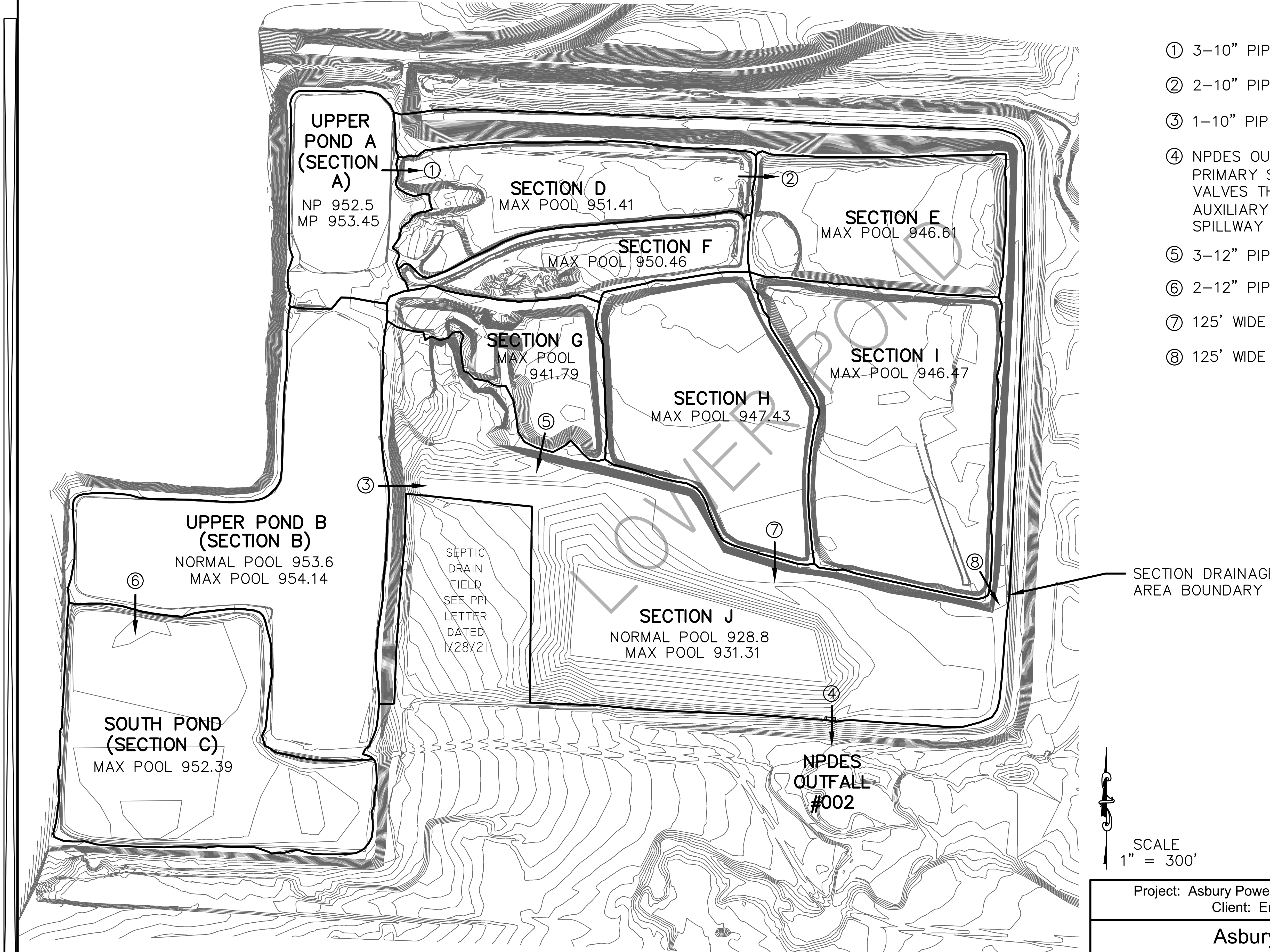
Site Location on 2017 Aerial Photograph

DATE: October 15, 2021

Project Number: 231518

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

FIGURE 2



① 3–10" PIPES THROUGH DIKE

② 2–10" PIPES THROUGH DIKE

③ 1–10" PIPE THROUGH DIKE

④ NPDES OUTFALL #002
PRIMARY SPILLWAY: 2–12" PIPES WITH VALVES THROUGH DIKE
AUXILIARY SPILLWAY: 24' WIDE CONCRETE SPILLWAY ON TOP OF DIKE

⑤ 3–12" PIPES THROUGH DIKE

⑥ 2–12" PIPES WITH VALVES THROUGH DIKE

⑦ 125' WIDE EARTHEN SPILLWAY ON TOP OF DIKE

⑧ 125' WIDE EARTHEN SPILLWAY ON TOP OF DIKE

Project: Asbury Power Plant, 21133 Uphill Lane, Asbury, Missouri
Client: Empire District Electric Company

Asbury CCR Impoundment

DATE: October 15, 2021 Project Number: 231518

PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS / MATERIALS TESTING LABORATORIES / ENVIRONMENTAL SERVICES

FIGURE 3

PALMERTON & PARRISH, INC.

APPENDIX II

PRECIPITATION TABLE & PIPE FLOW CALCULATIONS

NOAA Atlas 14, Volume 8, Version 2
Location name: Asbury, Missouri, USA*
Latitude: 37.3608°, Longitude: -94.5889°
Elevation: 941.17 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	**0.415** (0.326-0.517)	**0.476** (0.374-0.594)	**0.575** (0.451-0.720)	**0.657** (0.513-0.824)	**0.767** (0.582-0.981)	**0.850** (0.634-1.10)	**0.932** (0.678-1.23)	**1.01** (0.715-1.36)	**1.12** (0.767-1.54)	**1.20** (0.806-1.67)
10-min	**0.607** (0.478-0.758)	**0.697** (0.548-0.870)	**0.843** (0.661-1.05)	**0.961** (0.751-1.21)	**1.12** (0.852-1.44)	**1.25** (0.929-1.61)	**1.36** (0.993-1.80)	**1.49** (1.05-2.00)	**1.64** (1.12-2.25)	**1.76** (1.18-2.45)
15-min	**0.741** (0.583-0.924)	**0.850** (0.669-1.06)	**1.03** (0.806-1.28)	**1.17** (0.916-1.47)	**1.37** (1.04-1.75)	**1.52** (1.13-1.96)	**1.67** (1.21-2.19)	**1.81** (1.28-2.44)	**2.00** (1.37-2.75)	**2.15** (1.44-2.99)
30-min	**1.08** (0.854-1.35)	**1.25** (0.987-1.57)	**1.53** (1.20-1.91)	**1.75** (1.36-2.19)	**2.04** (1.55-2.61)	**2.26** (1.69-2.92)	**2.48** (1.80-3.26)	**2.69** (1.90-3.62)	**2.97** (2.02-4.07)	**3.17** (2.12-4.41)
60-min	**1.45** (1.14-1.81)	**1.68** (1.32-2.10)	**2.05** (1.61-2.57)	**2.37** (1.85-2.97)	**2.80** (2.13-3.60)	**3.14** (2.35-4.08)	**3.49** (2.54-4.61)	**3.84** (2.71-5.18)	**4.32** (2.95-5.94)	**4.68** (3.14-6.52)
2-hr	**1.82** (1.45-2.25)	**2.10** (1.67-2.60)	**2.58** (2.04-3.19)	**2.98** (2.35-3.71)	**3.56** (2.75-4.55)	**4.02** (3.04-5.19)	**4.50** (3.31-5.91)	**4.99** (3.56-6.70)	**5.67** (3.91-7.76)	**6.19** (4.18-8.57)
3-hr	**2.06** (1.65-2.53)	**2.37** (1.90-2.92)	**2.92** (2.33-3.59)	**3.40** (2.69-4.20)	**4.09** (3.18-5.23)	**4.67** (3.55-6.01)	**5.26** (3.90-6.91)	**5.90** (4.23-7.91)	**6.79** (4.71-9.28)	**7.49** (5.08-10.3)
6-hr	**2.48** (2.01-3.02)	**2.86** (2.31-3.48)	**3.53** (2.85-4.31)	**4.14** (3.32-5.07)	**5.05** (3.98-6.42)	**5.81** (4.47-7.44)	**6.62** (4.96-8.64)	**7.49** (5.42-9.98)	**8.72** (6.11-11.9)	**9.71** (6.63-13.3)
12-hr	**2.92** (2.39-3.52)	**3.38** (2.76-4.08)	**4.20** (3.42-5.07)	**4.93** (4.00-5.98)	**6.04** (4.81-7.61)	**6.96** (5.42-8.85)	**7.95** (6.01-10.3)	**9.01** (6.58-11.9)	**10.5** (7.43-14.2)	**11.7** (8.07-16.0)
24-hr	**3.39** (2.80-4.04)	**3.94** (3.25-4.70)	**4.90** (4.04-5.86)	**5.77** (4.73-6.92)	**7.06** (5.67-8.81)	**8.13** (6.39-10.2)	**9.28** (7.07-11.9)	**10.5** (7.73-13.8)	**12.2** (8.70-16.4)	**13.6** (9.44-18.4)
2-day	**3.89** (3.25-4.59)	**4.53** (3.78-5.35)	**5.64** (4.70-6.68)	**6.64** (5.50-7.89)	**8.13** (6.59-10.0)	**9.36** (7.42-11.7)	**10.7** (8.20-13.6)	**12.1** (8.94-15.7)	**14.0** (10.0-18.7)	**15.6** (10.9-21.0)
3-day	**4.22** (3.55-4.95)	**4.90** (4.12-5.76)	**6.11** (5.12-7.19)	**7.19** (5.99-8.49)	**8.80** (7.18-10.8)	**10.1** (8.07-12.6)	**11.5** (8.93-14.6)	**13.1** (9.73-16.9)	**15.2** (10.9-20.2)	**16.9** (11.8-22.6)
4-day	**4.50** (3.80-5.26)	**5.22** (4.41-6.11)	**6.49** (5.46-7.61)	**7.63** (6.39-8.98)	**9.32** (7.63-11.4)	**10.7** (8.57-13.2)	**12.2** (9.47-15.4)	**13.8** (10.3-17.8)	**16.0** (11.6-21.2)	**17.8** (12.5-23.8)
7-day	**5.30** (4.52-6.14)	**6.10** (5.20-7.08)	**7.50** (6.37-8.72)	**8.73** (7.38-10.2)	**10.5** (8.70-12.8)	**12.0** (9.70-14.7)	**13.6** (10.6-17.0)	**15.3** (11.5-19.6)	**17.6** (12.8-23.1)	**19.4** (13.7-25.8)
10-day	**6.04** (5.18-6.97)	**6.92** (5.93-7.99)	**8.43** (7.20-9.74)	**9.74** (8.27-11.3)	**11.6** (9.63-14.0)	**13.2** (10.6-16.0)	**14.8** (11.6-18.4)	**16.4** (12.4-21.0)	**18.8** (13.7-24.5)	**20.6** (14.6-27.2)
20-day	**8.21** (7.13-9.37)	**9.34** (8.09-10.7)	**11.2** (9.65-12.8)	**12.7** (10.9-14.6)	**14.8** (12.4-17.5)	**16.5** (13.4-19.8)	**18.2** (14.3-22.3)	**19.9** (15.1-25.0)	**22.1** (16.2-28.6)	**23.8** (17.0-31.3)
30-day	**10.0** (8.74-11.3)	**11.3** (9.89-12.9)	**13.5** (11.7-15.3)	**15.2** (13.2-17.4)	**17.6** (14.7-20.6)	**19.3** (15.8-23.0)	**21.1** (16.7-25.6)	**22.8** (17.4-28.5)	**25.0** (18.4-32.2)	**26.7** (19.1-34.9)
45-day	**12.2** (10.8-13.8)	**13.8** (12.2-15.6)	**16.4** (14.3-18.5)	**18.4** (16.0-20.9)	**21.0** (17.6-24.4)	**23.0** (18.9-27.1)	**24.8** (19.8-30.0)	**26.7** (20.4-33.1)	**28.9** (21.3-36.9)	**30.5** (22.0-39.8)
60-day	**14.1** (12.5-15.8)	**15.9** (14.1-17.9)	**18.8** (16.5-21.2)	**21.1** (18.4-23.8)	**24.0** (20.2-27.7)	**26.1** (21.5-30.6)	**28.1** (22.4-33.8)	**30.0** (23.0-37.1)	**32.3** (23.9-41.1)	**34.0** (24.5-44.1)

[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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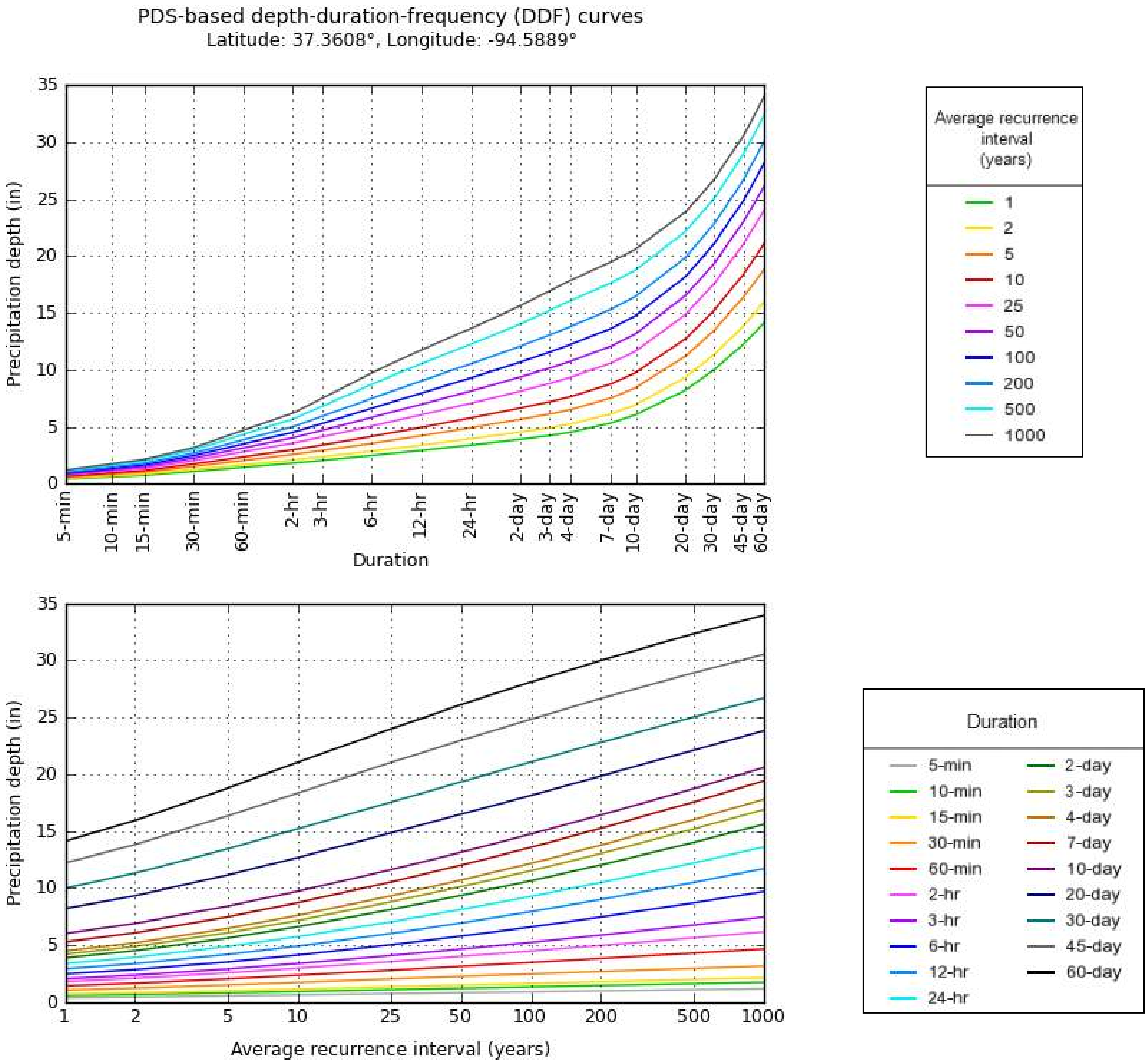
PF graphical



NOAA Atlas 14, Volume 8, Version 2 Created (GMT): Tue Oct 4 18:55:21 2016

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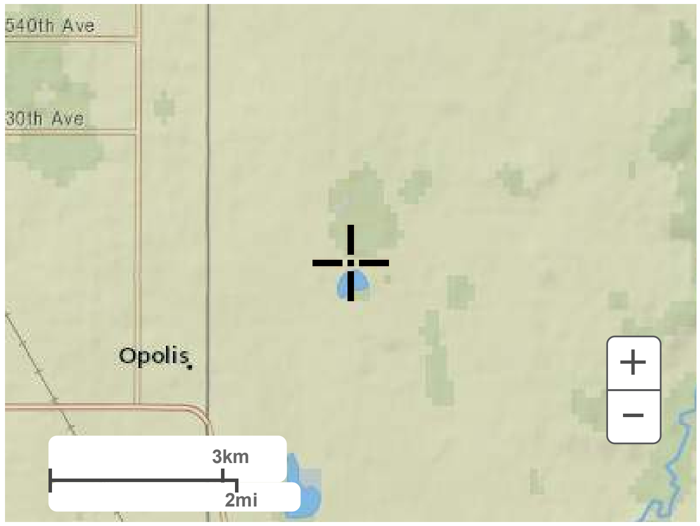
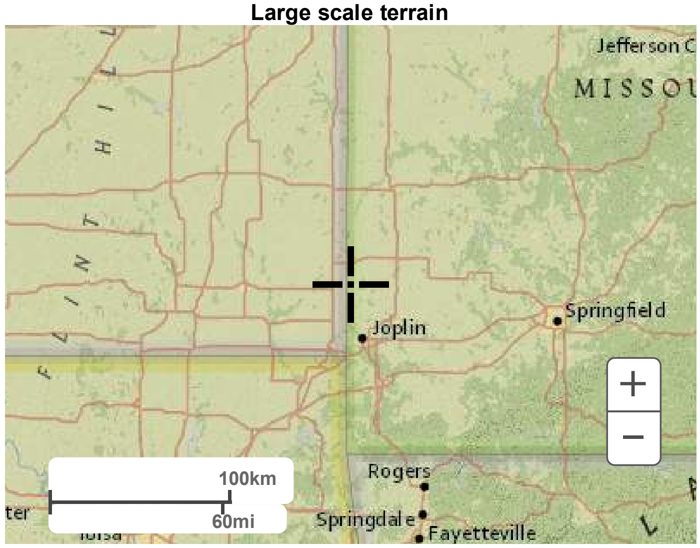
Maps & aerials

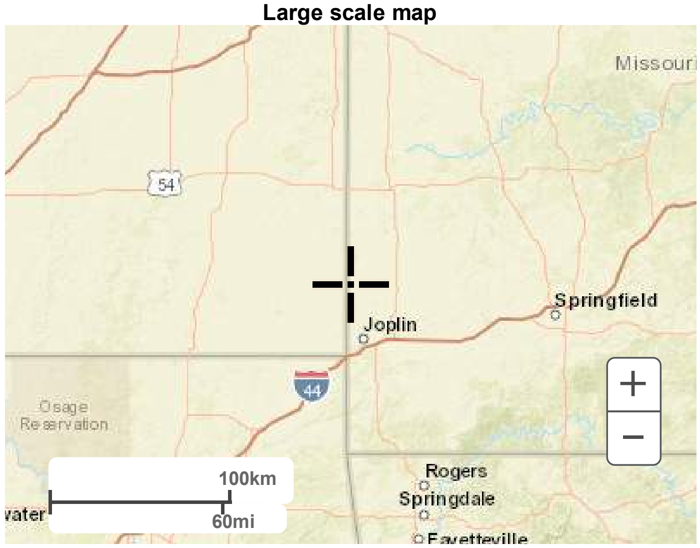
Small scale terrain



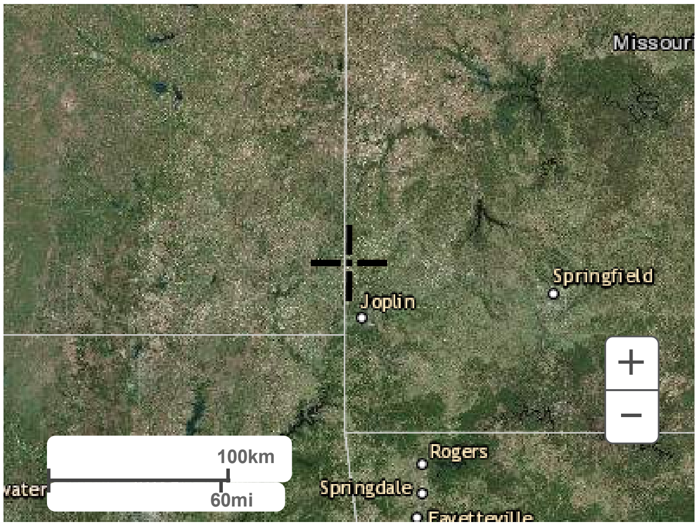
Large scale terrain



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

Manning's Equation $V = (Cf/n)\ R^{0.67}\ S^{0.5}$

$Q = VA$

V = Velocity (ft/sec) Cf = Conversion factor S = Slope
Q = Flow (cu ft/sec) n = Pipe roughness cooefficient
R = Hydraulic Radius (ft) = Area (A) / Wetted Perimeter (P)

Upper Pond A to Section D

Q	5.82	cfs
V	10.68	fps
Pipe Dia	10	in
	0.83	ft
n	0.012	PVC
Cf	1.49	
A	0.55	sq ft
P	2.62	ft
S	0.06	
R	0.21	ft

Section D to Section E

Q	4.76	cfs
V	8.72	fps
Pipe Dia	10	in
	0.83	ft
n	0.012	PVC
Cf	1.49	
A	0.55	sq ft
P	2.62	ft
S	0.04	
R	0.21	ft

Section G to Lower Pond J

Q	11.21	cfs
V	14.27	fps
Pipe Dia	12	in
	1	ft
n	0.012	PVC
Cf	1.49	
A	0.79	sq ft
P	3.14	ft
S	0.084	
R	0.25	ft

Upper Pond B to Lower Pond J

Q	3.36	cfs
V	6.17	fps
Pipe Dia	10	in
	0.83	ft
n	0.012	PVC
Cf	1.49	
A	0.55	sq ft
P	2.62	ft
S	0.02	
R	0.21	ft

Outlet - Outfall 002

Q	5.47	cfs
V	6.97	fps
Pipe Dia	12	in
	1	ft
n	0.012	PVC
Cf	1.49	
A	0.79	sq ft
P	3.14	ft
S	0.02	
R	0.25	ft

Hazen Williams Equation for Flow

$$Q = 0.285\,C\,(D^{2.63})(S^{0.54})$$

Q = Flow (cu ft/sec)
C = Hazen Williams Friction Coefficient (140 for PVC)
D = Pipe Diameter (ft)
S = Hydraulic Grade Line Slope = Water Height/Pipe Length (50')

Pressure flow from 10" pipe between Section D and Section E.

Water Height	S	Q	Water Elev
2.5	0.05	4.895	951
3.5	0.07	5.870	952

APPENDIX III

HEC OUTPUT

APPENDIX III-1

HEC-1 OUTPUT

UPPER POND A, SECTION D, & SECTION E

```
1****************************************                                  ****************************************
 *                                      *                                  *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                  *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN  1998                *                                  *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                                  *         609 SECOND STREET            *
 *                                      *                                  *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   12OCT16  TIME  10:12:46  *                                  *           (916) 756-1104             *
 *                                      *                                  *                                      *
 ****************************************                                  ****************************************


                      X     X  XXXXXXX   XXXXX           X
                      X     X  X        X     X         XX
                      X     X  X        X                X
                      XXXXXXX  XXXX     X       XXXXX    X
                      X     X  X        X                X
                      X     X  X        X     X          X
                      X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                               HEC-1 INPUT                                                   PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID   *************************************************************************
            2           ID   PROJECT NAME:            EDE ASBURY
            3           ID   CONSULTANT:              PALMERTON & PARRISH, INC.
            4           ID   PROJECT NUMBER:          231518
            5           ID   DESIGN ENGINEER:         DONALD C. NOWACK, P.E.
            6           ID   FILE NAME:               ADE.TXT
            7           ID   DATE:                    OCTOBER 17, 2016
```



```
            8           ID   RETURN FREQUENCY:        1000-YEAR, 24 HR
            9           ID   ABSTRACTION TECHNIQUE:  SCS CURVE NUMBER
           10           ID   SCENARIO:                UPPER POND A FLOWING INTO SECTIONS D AND E
           11           ID   ************************************************************************
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                        *                NUMBER OF 1 MIN INTERVALS USED FOR CALCULATION
                        * ***No OF INTERVALS*1-060  2-120  3-180  6-360  12-720 18-1080  24-1440
           12           IT      1                        1440
                        * ************************************************************************
                        *                NUMBER OF MIN IN EACH TIME INTERVAL
                        * ***MIN IN INTERVAL***1hr-3  2hr-6  3hr-9  6hr-18  12hr-36  18-54  24-72
           13           IN      72
           14           IO       4       0
                        *DIAGRAM
                        *         1000-YR
           15           JR    PREC   13.60
                        * ************************************************************************
                        *  STORM DISTRIBUTION:     SCS TYPE II
                        *  STORM DURATION:         24 HOUR
                        * ************************************************************************
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           16           KK     UPA
           17           KM     COAL PILE AND UPPER POND A
           18           PB    1.00
                        * DRAINAGE AREA:   24.08 ACRES = 0.0376  SQ. MI.
           19           BA  0.0376
                        * RAINFALL DISTRIBUTION
           20           PC  0.0000  0.0010  0.0020  0.0030  0.0041  0.0051  0.0062  0.0072  0.0083  0.0094
           21           PC  0.0105  0.0116  0.0127  0.0138  0.0150  0.0161  0.0173  0.0184  0.0196  0.0208
           22           PC  0.0220  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0306  0.0319  0.0332
           23           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0439  0.0452  0.0466
           24           PC  0.0480  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
           25           PC  0.0630  0.0646  0.0662  0.0679  0.0696  0.0712  0.0730  0.0747  0.0764  0.0782
           26           PC  0.0800  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931  0.0950  0.0970
           27           PC  0.0990  0.1010  0.1030  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
           28           PC  0.1200  0.1222  0.1246  0.1270  0.1296  0.1322  0.1350  0.1379  0.1408  0.1438
           29           PC  0.1470  0.1502  0.1534  0.1566  0.1598  0.1630  0.1663  0.1697  0.1733  0.1771
           30           PC  0.1810  0.1851  0.1895  0.1941  0.1989  0.2040  0.2094  0.2152  0.2214  0.2280
           31           PC  0.2350  0.2427  0.2513  0.2609  0.2715  0.2830  0.3068  0.3544  0.4308  0.5679
           32           PC  0.6630  0.6820  0.6986  0.7130  0.7252  0.7350  0.7434  0.7514  0.7588  0.7656
           33           PC  0.7720  0.7780  0.7835  0.7890  0.7942  0.7990  0.8036  0.8080  0.8122  0.8162
           34           PC  0.8200  0.8237  0.8273  0.8308  0.8342  0.8375  0.8409  0.8442  0.8474  0.8505
           35           PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
           36           PC  0.8800  0.8823  0.8845  0.8868  0.8890  0.8912  0.8934  0.8955  0.8976  0.8997
```



```
           37           PC  0.9018  0.9038  0.9058  0.9078  0.9097  0.9117  0.9136  0.9155  0.9173  0.9192
           38           PC  0.9210  0.9228  0.9245  0.9263  0.9280  0.9297  0.9313  0.9330  0.9346  0.9362
           39           PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466  0.9480  0.9493  0.9507
1                                               HEC-1 INPUT                                                   PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           40           PC  0.9520  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597  0.9610  0.9622  0.9635
           41           PC  0.9647  0.9660  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
           42           PC  0.9770  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
           43           PC  0.9887  0.9899  0.9910  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
           44           PC  1.0000
                        * SCS CURVE NUMBER: 98.00
           45           LS             98.00
                        * TIME OF CONCENTRATION: 0.0833 HR (LAG TIME = 0.6 * Tc = 0.0500 HR)
           46           UD  0.0500

           47           KK     UPA
           48           KM     UPPER POND A
           49           RS       1    ELEV  0953.0
           50           SA  3.4086  3.5908
           51           SE   953.0   954.0
           52           SQ  11.640   17.460
           53           SE   953.0   954.0
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           54           KK    SECD
           55           KM    SECTION D
           56           PB    1.00
                        * DRAINAGE AREA:   6.52 ACRES = 0.0102  SQ. MI.
           57           BA  0.0102
                        * SCS CURVE NUMBER: 98.00
           58           LS             98.00
                        * TIME OF CONCENTRATION: 0.0833 HR (LAG TIME = 0.6 * Tc = 0.0500 HR)
           59           UD  0.0500
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           60           KK    COMB                                                              KK
           61           KM     COMBINATION OF SUB BASINS                                        KM
           62           HC       2                                                              HC
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           63           KK   BASND
           64           KM   BASIN IN SECTION D
           65           RS       1    ELEV  0947.0
```



```
           66           SA  0.7216  1.9397  4.2220  4.7966  5.0074  5.1685
           67           SE   947.0   948.0   949.0   950.0   951.0   952.0
           68           SQ  0.0000  0.0000    9.50    9.52    9.79   11.74
           69           SE   947.0   948.0   949.0   950.0   951.0   952.0
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           70           KK    SECE
           71           KM    SECTION E
           72           PB    1.00
                        * DRAINAGE AREA:   7.02 ACRES = 0.0110  SQ. MI.
           73           BA  0.0110
                        * SCS CURVE NUMBER: 98.00
           74           LS             98.00
                        * TIME OF CONCENTRATION: 0.0833 HR (LAG TIME = 0.6 * Tc = 0.0500 HR)
           75           UD  0.0500
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
1                                               HEC-1 INPUT                                                   PAGE  3

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


           76           KK    COMB                                                              KK
           77           KM     COMBINATION OF SUB BASINS                                        KM
           78           HC       2                                                              HC
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           79           KK   BASNE
           80           KM   BASIN IN SECTION E
           81           RS       1    ELEV  0939.0
           82           SA  0.0936  0.3554  0.8310  2.1810  4.4409  5.2631  5.4799  5.6485  5.8193  5.9915
           83           SE   939.0   940.0   941.0   942.0   943.0   944.0   945.0   946.0   947.0   948.0
           84           SQ  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
           85           SE   939.0   940.0   941.0   942.0   943.0   944.0   945.0   946.0   947.0   948.0
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                        * ************************************************************************
           86           ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

   16         UPA
               V
```

```
              V
  47         UPA
              .
              .
  54          .         SECD
              .            .
              .            .
  60         COMB...........
              V
              V
  63        BASND
              .
              .
  70          .         SECE
              .            .
              .            .
  76         COMB...........
              V
              V
  79        BASNE

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                              **************************************
 *                                       *                              *                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS     *
 *             JUN   1998                *                              *   HYDROLOGIC ENGINEERING CENTER    *
 *           VERSION 4.1                 *                              *         609 SECOND STREET          *
 *                                       *                              *      DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   12OCT16  TIME  10:12:46   *                              *          (916) 756-1104            *
 *                                       *                              *                                    *
 *****************************************                              **************************************


                     ***************************************************************************
                     PROJECT NAME:           EDE ASBURY
                     CONSULTANT:             PALMERTON & PARRISH, INC.
                     PROJECT NUMBER:         231518
                     DESIGN ENGINEER:        DONALD C. NOWACK, P.E.
                     FILE NAME:              ADE.TXT
                     DATE:                   OCTOBER 17, 2016
                     RETURN FREQUENCY:       1000-YEAR, 24 HR
                     ABSTRACTION TECHNIQUE:  SCS CURVE NUMBER
```



```
                     SCENARIO:               UPPER POND A FLOWING INTO SECTIONS D AND E
                     ****************************************************************************

 14 IO        OUTPUT CONTROL VARIABLES
                    IPRNT          4  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                     NMIN          1  MINUTES IN COMPUTATION INTERVAL
                    IDATE     1    0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       1440  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     1    0  ENDING DATE
                   NDTIME       2359  ENDING TIME
                    ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .02 HOURS
                     TOTAL TIME BASE   23.98 HOURS

       ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT

   JP         MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

   JR         MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
                13.60


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 16 KK      *      UPA   *
            *            *
```



```
             **************
                               COAL PILE AND UPPER POND A

  13 IN         TIME DATA FOR INPUT TIME SERIES
                      JXMIN         72  TIME INTERVAL IN MINUTES
                     JXDATE     1    0  STARTING DATE
                     JXTIME          0  STARTING TIME

              SUBBASIN RUNOFF DATA

  19 BA         SUBBASIN CHARACTERISTICS
                      TAREA        .04  SUBBASIN AREA

                PRECIPITATION DATA

  19 PB               STORM       1.00  BASIN TOTAL PRECIPITATION

  19 PI           INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```



```
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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45 LS        SCS LOSS RATE
                  STRTL        .04  INITIAL ABSTRACTION
                 CRVNBR      98.00  CURVE NUMBER
                  RTIMP        .00  PERCENT IMPERVIOUS AREA

46 UD        SCS DIMENSIONLESS UNITGRAPH
                   TLAG        .05  LAG

                                     ***

                              UNIT HYDROGRAPH
                         17 END-OF-PERIOD ORDINATES
          55.     189.     301.     301.     234.     140.      87.      56.      35.      22.
          14.       9.       5.       3.       2.       1.       0.
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            *            *
  47 KK     *     UPA    *
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                     UPPER POND A

               HYDROGRAPH ROUTING DATA

  49 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC     953.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

  50 SA               AREA        3.4       3.6

  51 SE          ELEVATION     953.00    954.00

  52 SQ          DISCHARGE        12.       17.

  53 SE          ELEVATION     953.00    954.00

                                                ***

                                    COMPUTED STORAGE-ELEVATION DATA

        STORAGE        .00      3.50
      ELEVATION     953.00    954.00

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

        STORAGE        .00      3.50
        OUTFLOW      11.64     17.46
      ELEVATION     953.00    954.00


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  54 KK     *    SECD    *
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                     SECTION D

               SUBBASIN RUNOFF DATA

  57 BA          SUBBASIN CHARACTERISTICS
                     TAREA        .01  SUBBASIN AREA

               PRECIPITATION DATA

  56 PB              STORM       1.00  BASIN TOTAL PRECIPITATION

  19 PI            INCREMENTAL PRECIPITATION PATTERN
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  58 LS         SCS LOSS RATE
                     STRTL         .04  INITIAL ABSTRACTION
                    CRVNBR       98.00  CURVE NUMBER
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

  59 UD         SCS DIMENSIONLESS UNITGRAPH
                      TLAG         .05  LAG

                                                   ***

                                             UNIT HYDROGRAPH
                                        17 END-OF-PERIOD ORDINATES
            15.       51.       82.       82.       64.       38.       24.       15.       10.        6.
             4.        2.        1.        1.        1.        0.        0.


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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            *            *
  60 KK     *     COMB   *                                               KK
            *            *
            **************
                             COMBINATION OF SUB BASINS                         KM

  62 HC          HYDROGRAPH COMBINATION
                       ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                            ***


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


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            *            *
  63 KK     *    BASND   *
            *            *
            **************
                        BASIN IN SECTION D

                HYDROGRAPH ROUTING DATA

  65 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC      947.00  INITIAL CONDITION
                           X         .00  WORKING R AND D COEFFICIENT

  66 SA                 AREA          .7        1.9        4.2        4.8        5.0        5.2

  67 SE            ELEVATION      947.00     948.00     949.00     950.00     951.00     952.00

  68 SQ            DISCHARGE          0.         0.        10.        10.        10.        12.

  69 SE            ELEVATION      947.00     948.00     949.00     950.00     951.00     952.00

                                                            ***

                                             COMPUTED STORAGE-ELEVATION DATA
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          STORAGE        .00      1.28      4.29      8.80     13.70     18.78
        ELEVATION     947.00    948.00    949.00    950.00    951.00    952.00

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.28      4.29      8.80     13.70     18.78
          OUTFLOW        .00       .00      9.50      9.52      9.79     11.74
        ELEVATION     947.00    948.00    949.00    950.00    951.00    952.00


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


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          *            *
  70 KK   *     SECE   *
          *            *
          **************
                 SECTION E

             SUBBASIN RUNOFF DATA

  73 BA        SUBBASIN CHARACTERISTICS
                  TAREA        .01  SUBBASIN AREA

               PRECIPITATION DATA

  72 PB           STORM       1.00  BASIN TOTAL PRECIPITATION

  19 PI          INCREMENTAL PRECIPITATION PATTERN
                  .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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  74 LS          SCS LOSS RATE
                   STRTL        .04  INITIAL ABSTRACTION
                  CRVNBR      98.00  CURVE NUMBER
                   RTIMP        .00  PERCENT IMPERVIOUS AREA
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```
  75 UD          SCS DIMENSIONLESS UNITGRAPH
                        TLAG          .05  LAG

                                                                  ***

                                                            UNIT HYDROGRAPH
                                                       17 END-OF-PERIOD ORDINATES
              16.        55.        88.        88.        69.        41.        26.        17.        10.         6.
               4.         3.         2.         1.         1.         0.         0.


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  76 KK     *     COMB   *                                                                  KK
            *            *
            **************
                                  COMBINATION OF SUB BASINS                                        KM

  78 HC          HYDROGRAPH COMBINATION
                       ICOMP            2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


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            *            *
  79 KK     *    BASNE   *
            *            *
            **************
                             BASIN IN SECTION E

               HYDROGRAPH ROUTING DATA

  81 RS          STORAGE ROUTING
                       NSTPS            1  NUMBER OF SUBREACHES
                        ITYP         ELEV  TYPE OF INITIAL CONDITION
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                      RSVRIC       939.00  INITIAL CONDITION
                           X          .00 WORKING R AND D COEFFICIENT

  82 SA                 AREA          .1          .4          .8         2.2         4.4         5.3         5.5         5.6         5.8         6.0


  83 SE            ELEVATION      939.00      940.00      941.00      942.00      943.00      944.00      945.00      946.00      947.00      948.00


  84 SQ            DISCHARGE          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.


  85 SE            ELEVATION      939.00      940.00      941.00      942.00      943.00      944.00      945.00      946.00      947.00      948.00

                                                                  ***

                                                      COMPUTED STORAGE-ELEVATION DATA

            STORAGE         .00         .21         .79        2.24        5.48       10.33       15.70       21.27       27.00       32.90
          ELEVATION      939.00      940.00      941.00      942.00      943.00      944.00      945.00      946.00      947.00      948.00

                                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE         .00         .21         .79        2.24        5.48       10.33       15.70       21.27       27.00       32.90
            OUTFLOW         .00         .00         .00         .00         .00         .00         .00         .00         .00         .00
          ELEVATION      939.00      940.00      941.00      942.00      943.00      944.00      945.00      946.00      947.00      948.00

1
                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                  FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS


                                                            RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                       13.60

 HYDROGRAPH AT
+                   UPA       .04     1   FLOW          15.
                                          TIME        21.22

 ROUTED TO
```



```
+                   UPA       .04     1   FLOW          14.
                                          TIME        23.98

                                      ** PEAK STAGES IN FEET **
                                      1   STAGE      953.45
                                          TIME        23.98

 HYDROGRAPH AT
+                  SECD       .01     1   FLOW           4.
                                          TIME        18.27

  2 COMBINED AT
+                  COMB       .05     1   FLOW          18.
                                          TIME        23.98

 ROUTED TO
+                 BASND       .05     1   FLOW          11.
                                          TIME        23.98

                                      ** PEAK STAGES IN FEET **
                                      1   STAGE      951.41
                                          TIME        23.98

 HYDROGRAPH AT
+                  SECE       .01     1   FLOW           4.
                                          TIME        18.27

  2 COMBINED AT
+                  COMB       .06     1   FLOW          15.
                                          TIME        23.98

 ROUTED TO
+                 BASNE       .06     1   FLOW           0.
                                          TIME          .00

                                      ** PEAK STAGES IN FEET **
                                      1   STAGE      946.61
                                          TIME        23.98


 *** NORMAL END OF HEC-1 ***
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PALMERTON & PARRISH, INC.

APPENDIX III-2

HEC-1 OUTPUT

LOWER POND C

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1*****************************************                                     ***************************************
 *                                       *                                     *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                     *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN  1998                 *                                     *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                                     *         609 SECOND STREET           *
 *                                       *                                     *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   05OCT16  TIME  15:36:58   *                                     *          (916) 756-1104             *
 *                                       *                                     *                                     *
 *****************************************                                     ***************************************


                              X     X  XXXXXXX   XXXXX           X
                              X     X  X        X     X         XX
                              X     X  X        X                X
                              XXXXXXX  XXXX     X        XXXXX   X
                              X     X  X        X                X
                              X     X  X        X     X          X
                              X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                        HEC-1 INPUT                                         PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID   ************************************************************************
            2           ID   PROJECT NAME:            EDE ASBURY
            3           ID   CONSULTANT:              PALMERTON & PARRISH, INC.
            4           ID   PROJECT NUMBER:          231518
            5           ID   DESIGN ENGINEER:         DONALD C. NOWACK, P.E.
            6           ID   FILE NAME:               C.TXT
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            7           ID   DATE:                    OCTOBER 17, 2016
            8           ID   RETURN FREQUENCY:        1000-YEAR, 24 HR
            9           ID   ABSTRACTION TECHNIQUE:  SCS CURVE NUMBER
           10           ID   SCENARIO:                AREA C
           11           ID   ************************************************************************
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                        *                NUMBER OF 1 MIN INTERVALS USED FOR CALCULATION
                        * ***No OF INTERVALS*1-060  2-120  3-180  6-360  12-720 18-1080  24-1440
           12           IT      1                 1440
                        * ***********************************************************************
                        *                NUMBER OF MIN IN EACH TIME INTERVAL
                        * ***MIN IN INTERVAL***1hr-3  2hr-6  3hr-9  6hr-18  12hr-36  18-54  24-72
           13           IN     72
           14           IO      4       0
                        *DIAGRAM
                        *         1000-YR
           15           JR    PREC    13.60
                        * ***********************************************************************
                        *  STORM DISTRIBUTION:     SCS TYPE II
                        *  STORM DURATION:         24 HOUR
                        * ***********************************************************************
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           16           KK   SUBAC
           17           KM      SUB AREA C
           18           PB    1.00
                        * DRAINAGE AREA:   12.40 ACRES = 0.0194  SQ. MI.
           19           BA  0.0194
                        * RAINFALL DISTRIBUTION
           20           PC  0.0000  0.0010  0.0020  0.0030  0.0041  0.0051  0.0062  0.0072  0.0083  0.0094
           21           PC  0.0105  0.0116  0.0127  0.0138  0.0150  0.0161  0.0173  0.0184  0.0196  0.0208
           22           PC  0.0220  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0306  0.0319  0.0332
           23           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0439  0.0452  0.0466
           24           PC  0.0480  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
           25           PC  0.0630  0.0646  0.0662  0.0679  0.0696  0.0712  0.0730  0.0747  0.0764  0.0782
           26           PC  0.0800  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931  0.0950  0.0970
           27           PC  0.0990  0.1010  0.1030  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
           28           PC  0.1200  0.1222  0.1246  0.1270  0.1296  0.1322  0.1350  0.1379  0.1408  0.1438
           29           PC  0.1470  0.1502  0.1534  0.1566  0.1598  0.1630  0.1663  0.1697  0.1733  0.1771
           30           PC  0.1810  0.1851  0.1895  0.1941  0.1989  0.2040  0.2094  0.2152  0.2214  0.2280
           31           PC  0.2350  0.2427  0.2513  0.2609  0.2715  0.2830  0.3068  0.3544  0.4308  0.5679
           32           PC  0.6630  0.6820  0.6986  0.7130  0.7252  0.7350  0.7434  0.7514  0.7588  0.7656
           33           PC  0.7720  0.7780  0.7835  0.7890  0.7942  0.7990  0.8036  0.8080  0.8122  0.8162
           34           PC  0.8200  0.8237  0.8273  0.8308  0.8342  0.8375  0.8409  0.8442  0.8474  0.8505
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           35           PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
           36           PC  0.8800  0.8823  0.8845  0.8868  0.8890  0.8912  0.8934  0.8955  0.8976  0.8997
           37           PC  0.9018  0.9038  0.9058  0.9078  0.9097  0.9117  0.9136  0.9155  0.9173  0.9192
           38           PC  0.9210  0.9228  0.9245  0.9263  0.9280  0.9297  0.9313  0.9330  0.9346  0.9362
           39           PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466  0.9480  0.9493  0.9507
1                                        HEC-1 INPUT                                         PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           40           PC  0.9520  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597  0.9610  0.9622  0.9635
           41           PC  0.9647  0.9660  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
           42           PC  0.9770  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
           43           PC  0.9887  0.9899  0.9910  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
           44           PC  1.0000
                        * SCS CURVE NUMBER: 98.00
           45           LS            98.00
                        * TIME OF CONCENTRATION: 0.0833 HR (LAG TIME = 0.6 * Tc = 0.0500 HR)
           46           UD  0.0500

           47           KK   BASNC
           48           KM   BASIN C
           49           RS       1    ELEV   950.0
           50           SA  0.5564  5.4486  9.2805  10.598  11.433  11.769
           51           SE   950.0  0951.0   952.0   953.0   954.0   955.0
           52           SQ  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
           53           SE   950.0  0951.0   952.0   953.0   954.0   955.0
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                        * ***********************************************************************

           54           ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   16       SUBAC
                V
                V
   47       BASNC

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                     ***************************************
 *                                       *                                     *                                     *
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 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                     *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN  1998                 *                                     *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                                     *         609 SECOND STREET           *
 *                                       *                                     *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   05OCT16  TIME  15:36:58   *                                     *          (916) 756-1104             *
 *                                       *                                     *                                     *
 *****************************************                                     ***************************************



                            ************************************************************************
                            PROJECT NAME:            EDE ASBURY
                            CONSULTANT:              PALMERTON & PARRISH, INC.
                            PROJECT NUMBER:          231518
                            DESIGN ENGINEER:         DONALD C. NOWACK, P.E.
                            FILE NAME:               C.TXT
                            DATE:                    OCTOBER 17, 2016
                            RETURN FREQUENCY:        1000-YEAR, 24 HR
                            ABSTRACTION TECHNIQUE:  SCS CURVE NUMBER
                            SCENARIO:                AREA C
                            ************************************************************************

   14 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          4  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT           HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ       1440  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1    0  ENDING DATE
                       NDTIME       2359  ENDING TIME
                        ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL     .02 HOURS
                        TOTAL TIME BASE   23.98 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
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             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT

    JP         MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

    JR         MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                 13.60


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  16 KK   *    SUBAC   *
          *            *
          **************
                              SUB AREA C

  13 IN        TIME DATA FOR INPUT TIME SERIES
                     JXMIN          72  TIME INTERVAL IN MINUTES
                    JXDATE      1    0  STARTING DATE
                    JXTIME           0  STARTING TIME

             SUBBASIN RUNOFF DATA

  19 BA        SUBBASIN CHARACTERISTICS
                     TAREA         .02  SUBBASIN AREA

               PRECIPITATION DATA

  19 PB              STORM        1.00  BASIN TOTAL PRECIPITATION

  19 PI          INCREMENTAL PRECIPITATION PATTERN
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                .00     .00     .00     .00     .00     .00     .00     .00     .00

  45 LS         SCS LOSS RATE
                    STRTL        .04  INITIAL ABSTRACTION
                   CRVNBR      98.00  CURVE NUMBER
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

  46 UD         SCS DIMENSIONLESS UNITGRAPH
                     TLAG        .05  LAG

                                                ***

                                           UNIT HYDROGRAPH
                                      17 END-OF-PERIOD ORDINATES
            28.      97.     155.     155.     121.      72.      45.      29.      18.      11.
             7.       4.       3.       2.       1.       1.       0.


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           *************
           *           *
  47 KK    *    BASNC  *
           *           *
           *************
                       BASIN C

            HYDROGRAPH ROUTING DATA

  49 RS         STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       ELEV  TYPE OF INITIAL CONDITION
                   RSVRIC     950.00  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT
```


HEC-1 Model Output – Asbury CCR Impoundment – Lower Pond C October 17, 2016

```
  50 SA            AREA         .6      5.4      9.3     10.6     11.4     11.8

  51 SE       ELEVATION     950.00   951.00   952.00   953.00   954.00   955.00

  52 SQ       DISCHARGE         0.       0.       0.       0.       0.       0.

  53 SE       ELEVATION     950.00   951.00   952.00   953.00   954.00   955.00
                                                               ***

                                         COMPUTED STORAGE-ELEVATION DATA

          STORAGE       .00      2.58      9.86     19.79     30.81     42.41
        ELEVATION    950.00    951.00    952.00    953.00    954.00    955.00

                                     COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       .00      2.58      9.86     19.79     30.81     42.41
          OUTFLOW       .00       .00       .00       .00       .00       .00
        ELEVATION    950.00    951.00    952.00    953.00    954.00    955.00
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                  FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS


                                                         RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                       13.60

 HYDROGRAPH AT
+                 SUBAC       .02      1   FLOW          8.
                                           TIME       21.87

 ROUTED TO
+                 BASNC       .02      1   FLOW          0.
                                           TIME         .00

                                      ** PEAK STAGES IN FEET **
                                       1   STAGE     952.39
                                           TIME       23.98
```


HEC-1 Model Output – Asbury CCR Impoundment – Lower Pond C October 17, 2016

```
 *** NORMAL END OF HEC-1 ***
```

APPENDIX III-3

HEC-1 OUTPUT

SECTION F

```
1*****************************************                              ***************************************
 *                                       *                              *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                              *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                              *         609 SECOND STREET           *
 *                                       *                              *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   11OCT16  TIME  14:18:37   *                              *          (916) 756-1104             *
 *                                       *                              *                                     *
 *****************************************                              ***************************************


                     X     X  XXXXXXX   XXXXX          X
                     X     X  X        X     X        XX
                     X     X  X        X               X
                     XXXXXXX  XXXX     X       XXXXX   X
                     X     X  X        X               X
                     X     X  X        X     X         X
                     X     X  XXXXXXX   XXXXX         XXX


     THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

     THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
     THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
     NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
     DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
     KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                       HEC-1 INPUT                                                    PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID   ************************************************************************
            2           ID   PROJECT NAME:           EDE ASBURY
            3           ID   CONSULTANT:             PALMERTON & PARRISH, INC.
            4           ID   PROJECT NUMBER:         231518
            5           ID   DESIGN ENGINEER:        DONALD C. NOWACK, P.E.
            6           ID   FILE NAME:              F.TXT
```



```
            7           ID   DATE:                   OCTOBER 17, 2016
            8           ID   RETURN FREQUENCY:       1000-YEAR, 24 HR
            9           ID   ABSTRACTION TECHNIQUE:  SCS CURVE NUMBER
           10           ID   SCENARIO:               SECTION F
           11           ID   ************************************************************************
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                        *                NUMBER OF 1 MIN INTERVALS USED FOR CALCULATION
                        * ***No OF INTERVALS*1-060  2-120  3-180  6-360  12-720 18-1080  24-1440
           12           IT      1                    1440
                        * ************************************************************************
                        *                NUMBER OF MIN IN EACH TIME INTERVAL
                        * ***MIN IN INTERVAL***1hr-3  2hr-6  3hr-9  6hr-18  12hr-36  18-54  24-72
           13           IN      72
           14           IO      4       0
                        *DIAGRAM
                        *        1000-YR
           15           JR    PREC   13.60
                        * ************************************************************************
                        *  STORM DISTRIBUTION:     SCS TYPE II
                        *  STORM DURATION:         24 HOUR
                        * ************************************************************************
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           16           KK    SECF
           17           KM      SECTION F
           18           PB    1.00
                        * DRAINAGE AREA:   3.99 ACRES = 0.0062  SQ. MI.
           19           BA  0.0062
                        * RAINFALL DISTRIBUTION
           20           PC  0.0000  0.0010  0.0020  0.0030  0.0041  0.0051  0.0062  0.0072  0.0083  0.0094
           21           PC  0.0105  0.0116  0.0127  0.0138  0.0150  0.0161  0.0173  0.0184  0.0196  0.0208
           22           PC  0.0220  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0306  0.0319  0.0332
           23           PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0439  0.0452  0.0466
           24           PC  0.0480  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
           25           PC  0.0630  0.0646  0.0662  0.0679  0.0696  0.0712  0.0730  0.0747  0.0764  0.0782
           26           PC  0.0800  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931  0.0950  0.0970
           27           PC  0.0990  0.1010  0.1030  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
           28           PC  0.1200  0.1222  0.1246  0.1270  0.1296  0.1322  0.1350  0.1379  0.1408  0.1438
           29           PC  0.1470  0.1502  0.1534  0.1566  0.1598  0.1630  0.1663  0.1697  0.1733  0.1771
           30           PC  0.1810  0.1851  0.1895  0.1941  0.1989  0.2040  0.2094  0.2152  0.2214  0.2280
           31           PC  0.2350  0.2427  0.2513  0.2609  0.2715  0.2830  0.3068  0.3544  0.4308  0.5679
           32           PC  0.6630  0.6820  0.6986  0.7130  0.7252  0.7350  0.7434  0.7514  0.7588  0.7656
           33           PC  0.7720  0.7780  0.7835  0.7890  0.7942  0.7990  0.8036  0.8080  0.8122  0.8162
           34           PC  0.8200  0.8237  0.8273  0.8308  0.8342  0.8375  0.8409  0.8442  0.8474  0.8505
```



```
           35           PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
           36           PC  0.8800  0.8823  0.8845  0.8868  0.8890  0.8912  0.8934  0.8955  0.8976  0.8997
           37           PC  0.9018  0.9038  0.9058  0.9078  0.9097  0.9117  0.9136  0.9155  0.9173  0.9192
           38           PC  0.9210  0.9228  0.9245  0.9263  0.9280  0.9297  0.9313  0.9330  0.9346  0.9362
           39           PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466  0.9480  0.9493  0.9507
1                                       HEC-1 INPUT                                                    PAGE  2

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           40           PC  0.9520  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597  0.9610  0.9622  0.9635
           41           PC  0.9647  0.9660  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
           42           PC  0.9770  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
           43           PC  0.9887  0.9899  0.9910  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
           44           PC  1.0000
                        * SCS CURVE NUMBER: 98.00
           45           LS           98.00
                        * TIME OF CONCENTRATION: 0.0833 HR (LAG TIME = 0.6 * Tc = 0.0500 HR)
           46           UD  0.0500

           47           KK   BASNF
           48           KM   BASIN SECTION F
           49           RS        1    ELEV   946.0
           50           SA  0.0814  0.3307  0.6452  1.5414  1.8699  2.3758  3.1287  3.3812
           51           SE   946.0  0947.0   948.0   949.0   950.0   951.0   952.0   953.0
           52           SQ  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
           53           SE   946.0  0947.0   948.0   949.0   950.0   951.0   952.0   953.0
                        * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                        * ************************************************************************
           54           ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    16        SECF
                V
                V
    47       BASNF

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                              ***************************************
 *                                       *                              *                                     *
```



```
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                              *   HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                 *                              *         609 SECOND STREET           *
 *                                       *                              *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   11OCT16  TIME  14:18:37   *                              *          (916) 756-1104             *
 *                                       *                              *                                     *
 *****************************************                              ***************************************



                          ************************************************************************
                          PROJECT NAME:           EDE ASBURY
                          CONSULTANT:             PALMERTON & PARRISH, INC.
                          PROJECT NUMBER:         231518
                          DESIGN ENGINEER:        DONALD C. NOWACK, P.E.
                          FILE NAME:              F.TXT
                          DATE:                   OCTOBER 17, 2016
                          RETURN FREQUENCY:       1000-YEAR, 24 HR
                          ABSTRACTION TECHNIQUE:  SCS CURVE NUMBER
                          SCENARIO:               SECTION F
                          ************************************************************************

   14 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           4  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN           1  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ        1440  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1    0  ENDING DATE
                       NDTIME        2359  ENDING TIME
                        ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL     .02 HOURS
                        TOTAL TIME BASE   23.98 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
```

```
              LENGTH, ELEVATION     FEET
              FLOW                  CUBIC FEET PER SECOND
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                  13.60


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
  16 KK    *     SECF   *
           *            *
           **************
                            SECTION F

  13 IN         TIME DATA FOR INPUT TIME SERIES
                      JXMIN          72  TIME INTERVAL IN MINUTES
                     JXDATE      1    0  STARTING DATE
                     JXTIME           0  STARTING TIME

              SUBBASIN RUNOFF DATA

  19 BA         SUBBASIN CHARACTERISTICS
                      TAREA         .01  SUBBASIN AREA

                PRECIPITATION DATA

  19 PB               STORM        1.00  BASIN TOTAL PRECIPITATION

  19 PI           INCREMENTAL PRECIPITATION PATTERN
                       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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 45 LS          SCS LOSS RATE
                     STRTL         .04  INITIAL ABSTRACTION
                    CRVNBR       98.00  CURVE NUMBER
                     RTIMP         .00  PERCENT IMPERVIOUS AREA

 46 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG         .05  LAG

                                                                ***

                                                         UNIT HYDROGRAPH
                                                    17 END-OF-PERIOD ORDINATES
               9.       31.       50.       50.       39.       23.       14.        9.        6.        4.
               2.        1.        1.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
 47 KK     *    BASNF   *
           *            *
           **************
                          BASIN SECTION F

             HYDROGRAPH ROUTING DATA

 49 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC      946.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT
```



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   50 SA          AREA          .1        .3        .6       1.5       1.9       2.4       3.1       3.4

   51 SE     ELEVATION      946.00    947.00    948.00    949.00    950.00    951.00    952.00    953.00

   52 SQ     DISCHARGE          0.        0.        0.        0.        0.        0.        0.        0.

   53 SE     ELEVATION      946.00    947.00    948.00    949.00    950.00    951.00    952.00    953.00

                                                               ***

                                                  COMPUTED STORAGE-ELEVATION DATA

           STORAGE       .00       .19       .67      1.73      3.44      5.55      8.30     11.55
         ELEVATION    946.00    947.00    948.00    949.00    950.00    951.00    952.00    953.00

                                              COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

           STORAGE       .00       .19       .67      1.73      3.44      5.55      8.30     11.55
           OUTFLOW       .00       .00       .00       .00       .00       .00       .00       .00
         ELEVATION    946.00    947.00    948.00    949.00    950.00    951.00    952.00    953.00
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                  FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                  TIME TO PEAK IN HOURS


                                                            RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN            RATIO 1
                                                       13.60

 HYDROGRAPH AT
+                  SECF       .01       1  FLOW           2.
                                           TIME        18.37

 ROUTED TO
+                 BASNF       .01       1  FLOW           0.
                                           TIME          .00

                                     ** PEAK STAGES IN FEET **
                                        1  STAGE      950.46
                                           TIME        23.98
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 *** NORMAL END OF HEC-1 ***
```

APPENDIX III-4

HEC-1 OUTPUT

SECTION G

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1*****************************************                            ***************************************
 *                                       *                            *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                            *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN  1998                 *                            *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                            *         609 SECOND STREET           *
 *                                       *                            *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   11OCT16  TIME  14:18:47   *                            *          (916) 756-1104             *
 *                                       *                            *                                     *
 *****************************************                            ***************************************


                                   X     X  XXXXXXX   XXXXX           X
                                   X     X  X        X     X         XX
                                   X     X  X        X                X
                                   XXXXXXX  XXXX     X        XXXXX   X
                                   X     X  X        X                X
                                   X     X  X        X     X          X
                                   X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                             HEC-1 INPUT                                                    PAGE  1

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1            ID   ***************************************************************************
            2            ID   PROJECT NAME:            EDE ASBURY
            3            ID   CONSULTANT:              PALMERTON & PARRISH, INC.
            4            ID   PROJECT NUMBER:          231518
            5            ID   DESIGN ENGINEER:         DONALD C. NOWACK, P.E.
            6            ID   FILE NAME:               G.TXT
```



```
            7            ID   DATE:                    OCTOBER 17, 2016
            8            ID   RETURN FREQUENCY:        1000-YEAR, 24 HR
            9            ID   ABSTRACTION TECHNIQUE:   SCS CURVE NUMBER
           10            ID   SCENARIO:                SECTION G
           11            ID   ***************************************************************************
                         * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                         *                 NUMBER OF 1 MIN INTERVALS USED FOR CALCULATION
                         * ***No OF INTERVALS*1-060  2-120  3-180  6-360  12-720 18-1080  24-1440
           12            IT       1                   1440
                         * ***************************************************************************
                         *                 NUMBER OF MIN IN EACH TIME INTERVAL
                         * ***MIN IN INTERVAL***1hr-3  2hr-6  3hr-9  6hr-18  12hr-36  18-54  24-72
           13            IN      72
           14            IO       4       0
                         *DIAGRAM
                         *          1000-YR
           15            JR    PREC    13.60
                         * ***************************************************************************
                         *  STORM DISTRIBUTION:     SCS TYPE II
                         *  STORM DURATION:         24 HOUR
                         * ***************************************************************************
                         * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10

           16            KK    SECG
           17            KM      SECTION G
           18            PB    1.00
                         * DRAINAGE AREA:   4.39 ACRES = 0.0069  SQ. MI.
           19            BA  0.0069
                         * RAINFALL DISTRIBUTION
           20            PC  0.0000  0.0010  0.0020  0.0030  0.0041  0.0051  0.0062  0.0072  0.0083  0.0094
           21            PC  0.0105  0.0116  0.0127  0.0138  0.0150  0.0161  0.0173  0.0184  0.0196  0.0208
           22            PC  0.0220  0.0232  0.0244  0.0257  0.0269  0.0281  0.0294  0.0306  0.0319  0.0332
           23            PC  0.0345  0.0358  0.0371  0.0384  0.0398  0.0411  0.0425  0.0439  0.0452  0.0466
           24            PC  0.0480  0.0494  0.0508  0.0523  0.0538  0.0553  0.0568  0.0583  0.0598  0.0614
           25            PC  0.0630  0.0646  0.0662  0.0679  0.0696  0.0712  0.0730  0.0747  0.0764  0.0782
           26            PC  0.0800  0.0818  0.0836  0.0855  0.0874  0.0892  0.0912  0.0931  0.0950  0.0970
           27            PC  0.0990  0.1010  0.1030  0.1051  0.1072  0.1093  0.1114  0.1135  0.1156  0.1178
           28            PC  0.1200  0.1222  0.1246  0.1270  0.1296  0.1322  0.1350  0.1379  0.1408  0.1438
           29            PC  0.1470  0.1502  0.1534  0.1566  0.1598  0.1630  0.1663  0.1697  0.1733  0.1771
           30            PC  0.1810  0.1851  0.1895  0.1941  0.1989  0.2040  0.2094  0.2152  0.2214  0.2280
           31            PC  0.2350  0.2427  0.2513  0.2609  0.2715  0.2830  0.3068  0.3544  0.4308  0.5679
           32            PC  0.6630  0.6820  0.6986  0.7130  0.7252  0.7350  0.7434  0.7514  0.7588  0.7656
           33            PC  0.7720  0.7780  0.7835  0.7890  0.7942  0.7990  0.8036  0.8080  0.8122  0.8162
           34            PC  0.8200  0.8237  0.8273  0.8308  0.8342  0.8375  0.8409  0.8442  0.8474  0.8505
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           35            PC  0.8535  0.8565  0.8594  0.8622  0.8649  0.8676  0.8702  0.8728  0.8753  0.8777
           36            PC  0.8800  0.8823  0.8845  0.8868  0.8890  0.8912  0.8934  0.8955  0.8976  0.8997
           37            PC  0.9018  0.9038  0.9058  0.9078  0.9097  0.9117  0.9136  0.9155  0.9173  0.9192
           38            PC  0.9210  0.9228  0.9245  0.9263  0.9280  0.9297  0.9313  0.9330  0.9346  0.9362
           39            PC  0.9377  0.9393  0.9408  0.9423  0.9438  0.9452  0.9466  0.9480  0.9493  0.9507
1                                             HEC-1 INPUT                                                    PAGE  2

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           40            PC  0.9520  0.9533  0.9546  0.9559  0.9572  0.9584  0.9597  0.9610  0.9622  0.9635
           41            PC  0.9647  0.9660  0.9672  0.9685  0.9697  0.9709  0.9722  0.9734  0.9746  0.9758
           42            PC  0.9770  0.9782  0.9794  0.9806  0.9818  0.9829  0.9841  0.9853  0.9864  0.9876
           43            PC  0.9887  0.9899  0.9910  0.9922  0.9933  0.9944  0.9956  0.9967  0.9978  0.9989
           44            PC  1.0000
                         * SCS CURVE NUMBER: 98.00
           45            LS            98.00
                         * TIME OF CONCENTRATION: 0.0833 HR (LAG TIME = 0.6 * Tc = 0.0500 HR)
           46            UD  0.0500

           47            KK   BASNG
           48            KM     BASIN SECTION G
           49            RS       1    ELEV   937.0
           50            SA  0.0631  0.6902  1.2727  1.5650  1.7619  1.8770  2.1662  2.3247  2.4937  2.6722
           51            SE   937.0   938.0   939.0   940.0   941.0   942.0   943.0   944.0   945.0   946.0
           52            SQ  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
           53            SE   937.0   938.0   939.0   940.0   941.0   942.0   943.0   944.0   945.0   946.0
                         * .....1.......2.......3.......4.......5.......6.......7.......8.......9......10
                         * ***************************************************************************

           54            ZZ
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   16         SECG
               V
               V
   47        BASNG

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                            ***************************************
 *                                       *                            *                                     *
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 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                            *   U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN  1998                 *                            *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                            *         609 SECOND STREET           *
 *                                       *                            *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   11OCT16  TIME  14:18:47   *                            *          (916) 756-1104             *
 *                                       *                            *                                     *
 *****************************************                            ***************************************


                         ***************************************************************************
                         PROJECT NAME:            EDE ASBURY
                         CONSULTANT:              PALMERTON & PARRISH, INC.
                         PROJECT NUMBER:          231518
                         DESIGN ENGINEER:         DONALD C. NOWACK, P.E.
                         FILE NAME:               G.TXT
                         DATE:                    OCTOBER 17, 2016
                         RETURN FREQUENCY:        1000-YEAR, 24 HR
                         ABSTRACTION TECHNIQUE:   SCS CURVE NUMBER
                         SCENARIO:                SECTION G
                         ***************************************************************************

  14 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT           HYDROGRAPH TIME DATA
                        NMIN          1  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ       1440  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1    0  ENDING DATE
                      NDTIME       2359  ENDING TIME
                       ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE   23.98 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
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            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT

   JP         MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

   JR         MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
                13.60


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


         **************
         *            *
  16 KK  *     SECG   *
         *            *
         **************
                          SECTION G

  13 IN       TIME DATA FOR INPUT TIME SERIES
                    JXMIN         72  TIME INTERVAL IN MINUTES
                   JXDATE      1   0  STARTING DATE
                   JXTIME          0  STARTING TIME

            SUBBASIN RUNOFF DATA

  19 BA       SUBBASIN CHARACTERISTICS
                    TAREA        .01  SUBBASIN AREA

              PRECIPITATION DATA

  19 PB             STORM       1.00  BASIN TOTAL PRECIPITATION

  19 PI         INCREMENTAL PRECIPITATION PATTERN
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 45 LS         SCS LOSS RATE
                 STRTL          .04  INITIAL ABSTRACTION
                CRVNBR        98.00  CURVE NUMBER
                 RTIMP          .00  PERCENT IMPERVIOUS AREA

 46 UD         SCS DIMENSIONLESS UNITGRAPH
                  TLAG          .05  LAG

                                                         ***

                                                    UNIT HYDROGRAPH
                                               17 END-OF-PERIOD ORDINATES
              10.       35.       55.       55.       43.       26.       16.       10.        6.        4.
               3.        2.        1.        1.        0.        0.        0.

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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            *            *
 47 KK      *    BASNG   *
            *            *
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                       BASIN SECTION G

             HYDROGRAPH ROUTING DATA

 49 RS         STORAGE ROUTING
                 NSTPS            1  NUMBER OF SUBREACHES
                  ITYP         ELEV  TYPE OF INITIAL CONDITION
                RSVRIC       937.00  INITIAL CONDITION
                     X          .00 WORKING R AND D COEFFICIENT
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   50 SA            AREA          .1         .7        1.3        1.6        1.8        1.9        2.2        2.3        2.5        2.7

   51 SE       ELEVATION      937.00     938.00     939.00     940.00     941.00     942.00     943.00     944.00     945.00     946.00

   52 SQ       DISCHARGE          0.         0.         0.         0.         0.         0.         0.         0.         0.         0.

   53 SE       ELEVATION      937.00     938.00     939.00     940.00     941.00     942.00     943.00     944.00     945.00     946.00

                                                                   ***

                                                  COMPUTED STORAGE-ELEVATION DATA

          STORAGE       .00       .32      1.29      2.70      4.37      6.19      8.21     10.45     12.86     15.44
        ELEVATION    937.00    938.00    939.00    940.00    941.00    942.00    943.00    944.00    945.00    946.00

                                              COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE       .00       .32      1.29      2.70      4.37      6.19      8.21     10.45     12.86     15.44
          OUTFLOW       .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
        ELEVATION    937.00    938.00    939.00    940.00    941.00    942.00    943.00    944.00    945.00    946.00
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                  FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS

                                                         RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN           RATIO 1
                                                      13.60

 HYDROGRAPH AT
+                   SECG       .01      1   FLOW         3.
                                            TIME      18.27

 ROUTED TO
+                  BASNG       .01      1   FLOW         0.
                                            TIME        .00
```



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                                    ** PEAK STAGES IN FEET **
                                    1   STAGE      941.29
                                        TIME        23.98


 *** NORMAL END OF HEC-1 ***
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APPENDIX III-5

HEC-HMS OUTPUT

SECTION H, SECTION I, UPPER POND B, & LOWER POND J

Project: Flow_Model
Simulation Run: Run 1
Simulation Start: 31 December 1999, 24:00
Simulation End: 1 January 2000, 24:00

HMS Version: 4.8
Executed: 15 October 2021, 18:35

Global Parameter Summary - Subbasin

Area (ft^2)

Element Name	Area (ft^2)
Section H	0.01
Section B	0.02
Section J	0.06
Section I	0.02

Downstream

Element Name	Downstream
Section H	Reservoir H
Section B	Reservoir B
Section J	Reservoir J
Section I	Reservoir I

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number
Section H	0	98
Section B	0	98
Section J	0	82.31
Section I	0	98

Transform: Scs

Element Name	Lag	Unitgraph Type
Section H	3	Standard
Section B	3	Standard
Section J	3	Standard
Section I	3	Standard

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Section H	0.01	172.49	01Jan2000, 11:56	13.35
Section B	0.02	268.57	01Jan2000, 11:56	13.35
Section J	0.06	668.18	01Jan2000, 11:56	11.31
Reservoir B	0.02	6.72	01Jan2000, 11:50	6.55
Reservoir H	0.01	105.08	01Jan2000, 12:02	13.16
Section I	0.02	221.11	01Jan2000, 11:56	13.35
Reservoir I	0.02	120.18	01Jan2000, 12:02	13.12
Reservoir J	0.12	98.01	01Jan2000, 12:46	8.25
Outfall	0.12	98.01	01Jan2000, 12:46	8.25

Subbasin: Section H

Area (ft²) : 0.01
Downstream : Reservoir H

Loss Rate: Scs

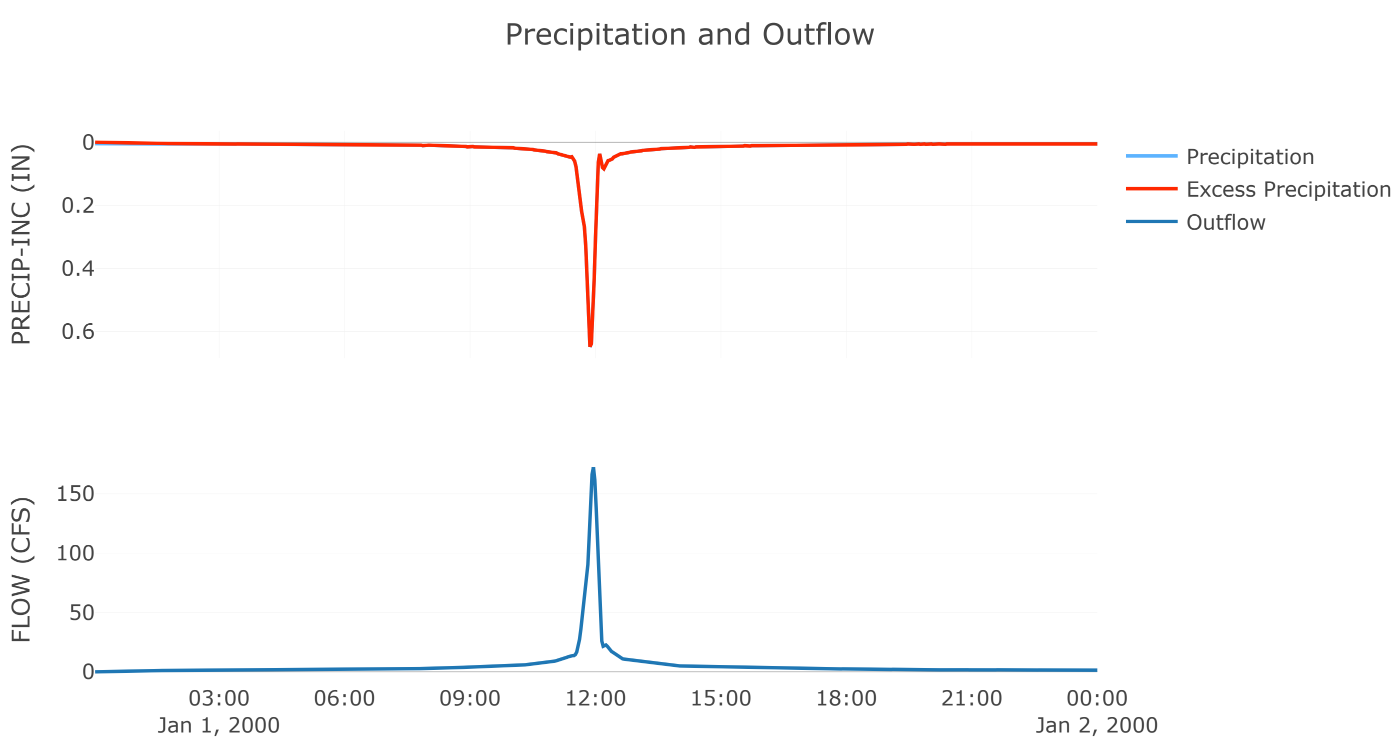
Percent Impervious Area	0
Curve Number	98

Transform: Scs

Lag	3
Unitgraph Type	Standard

Results: Section H

Peak Discharge (CFS)	172.49
Time of Peak Discharge	01Jan2000, 11:56
Volume (IN)	13.35
Precipitation Volume (AC - FT)	10.81
Loss Volume (AC - FT)	0.19
Excess Volume (AC - FT)	10.62
Direct Runoff Volume (AC - FT)	10.61
Baseflow Volume (AC - FT)	0



Subbasin: Section B

Area (ft²) : 0.02
Downstream : Reservoir B

Loss Rate: Scs

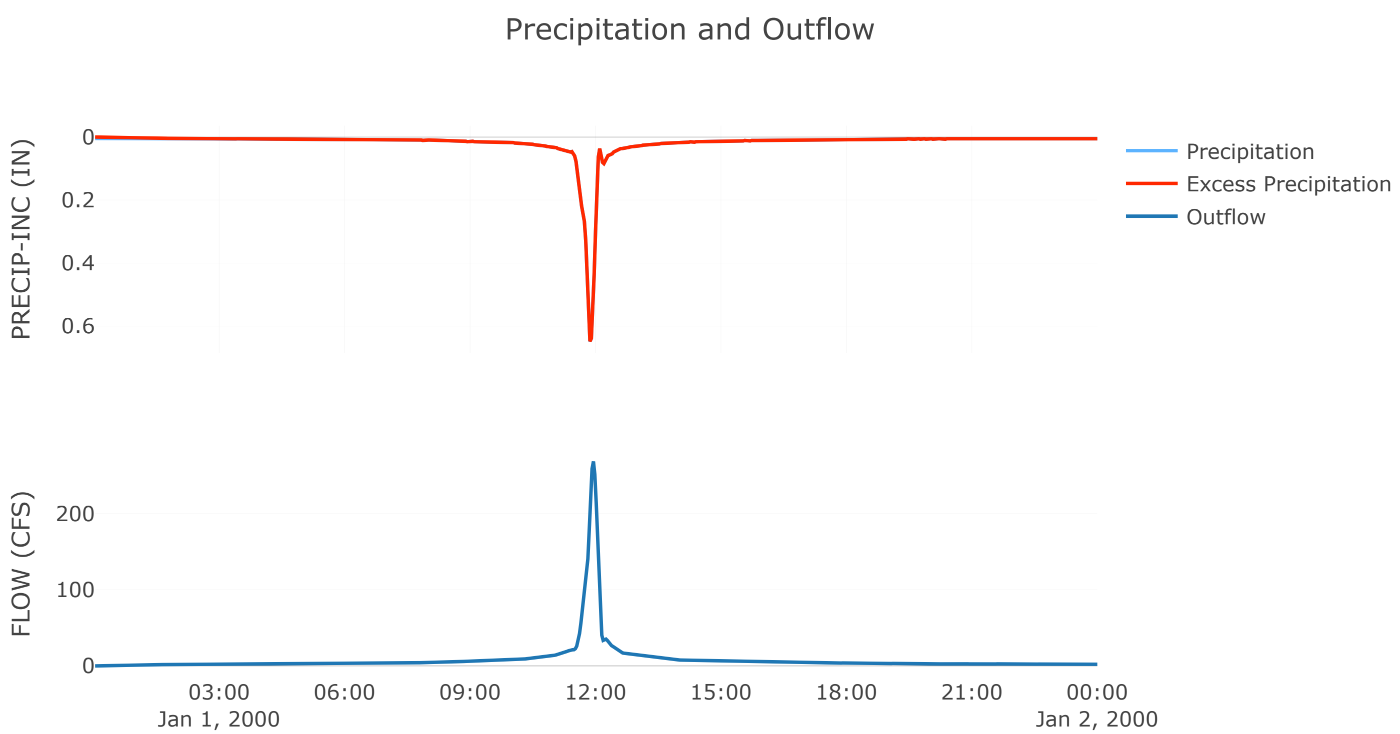
Percent Impervious Area	0
Curve Number	98

Transform: Scs

Lag	3
Unitgraph Type	Standard

Results: Section B

Peak Discharge (CFS)	268.57
Time of Peak Discharge	01Jan2000, 11:56
Volume (IN)	13.35
Precipitation Volume (AC - FT)	16.83
Loss Volume (AC - FT)	0.3
Excess Volume (AC - FT)	16.53
Direct Runoff Volume (AC - FT)	16.52
Baseflow Volume (AC - FT)	0



Subbasin: Section J

Area (ft²) : 0.06
Downstream : Reservoir J

Loss Rate: Scs

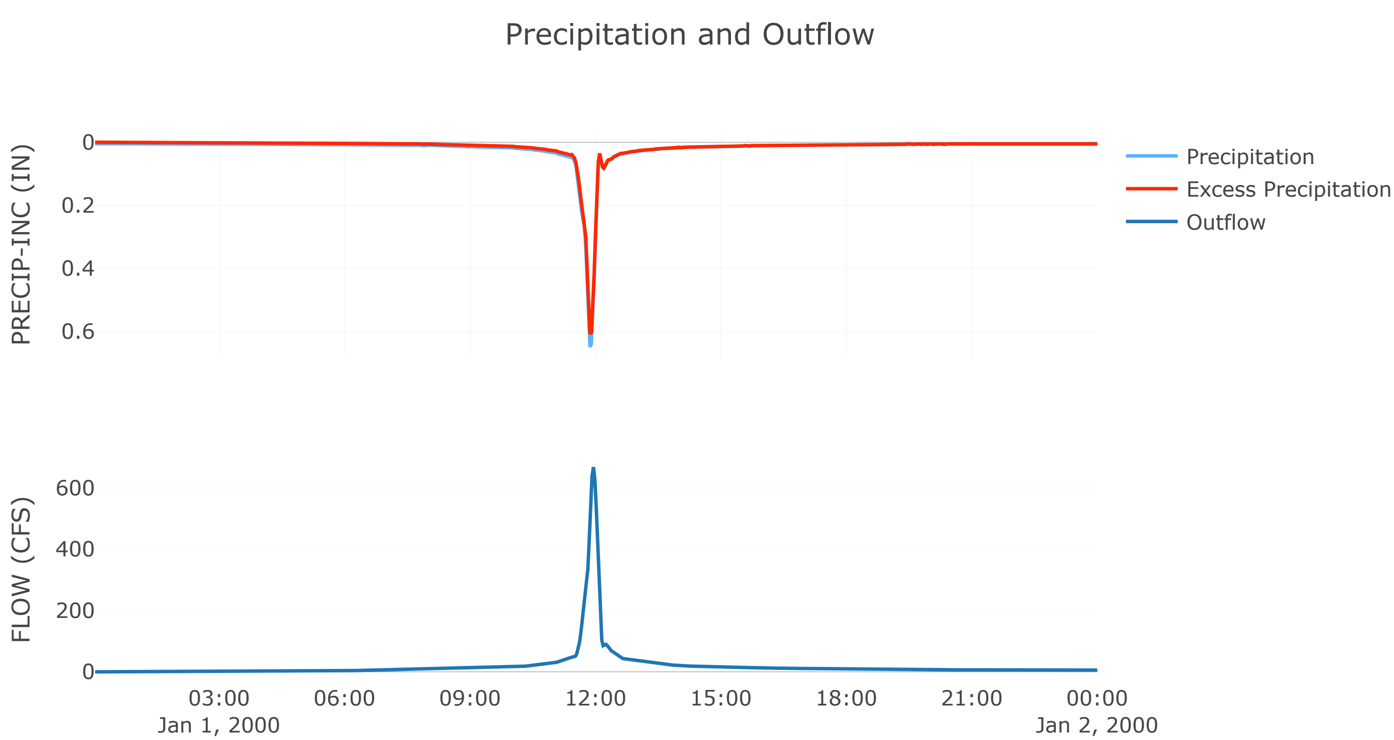
Percent Impervious Area	0
Curve Number	82.31

Transform: Scs

Lag	3
Unitgraph Type	Standard

Results: Section J

Peak Discharge (CFS)	668.18
Time of Peak Discharge	01Jan2000, 11:56
Volume (IN)	11.31
Precipitation Volume (AC - FT)	44.54
Loss Volume (AC - FT)	7.46
Excess Volume (AC - FT)	37.08
Direct Runoff Volume (AC - FT)	37.04
Baseflow Volume (AC - FT)	0

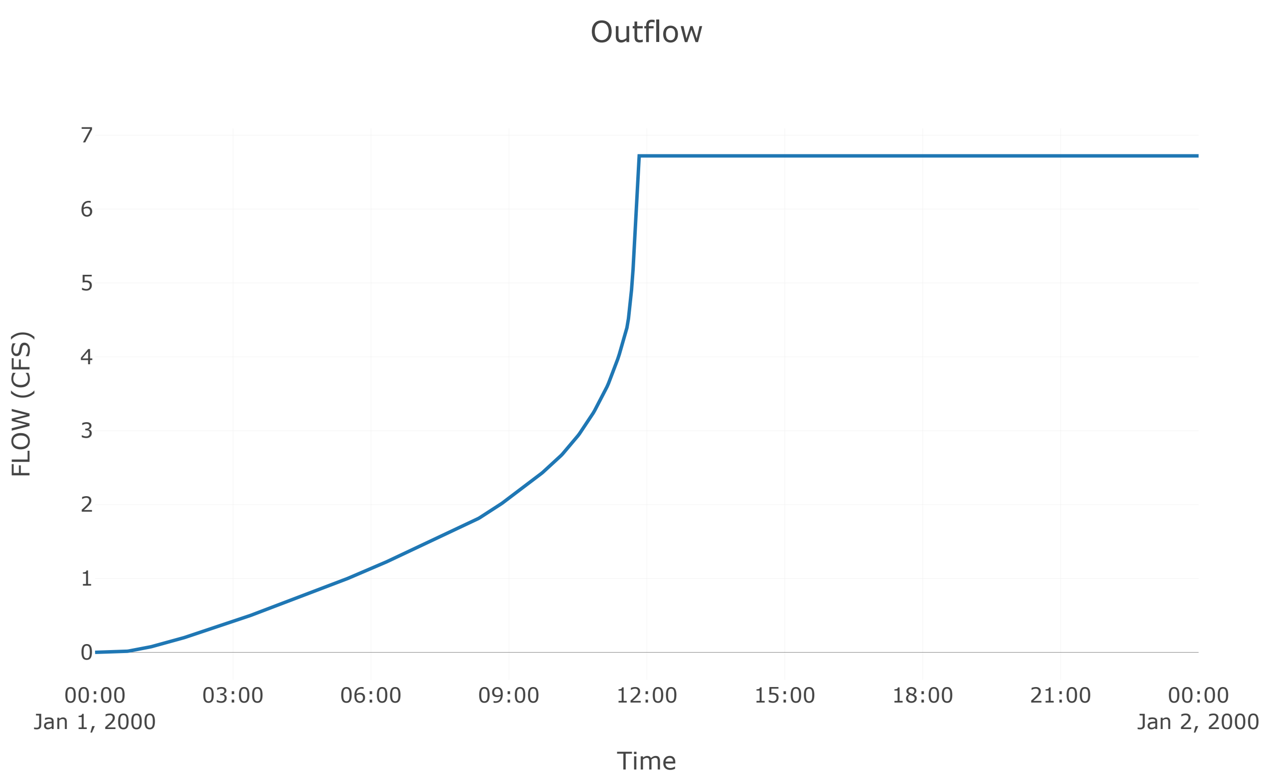


Reservoir: Reservoir B

Downstream : Reservoir J

Results: Reservoir B

Peak Discharge (CFS)	6.72
Time of Peak Discharge	01Jan2000, 11:50
Volume (IN)	6.55
Peak Inflow (CFS)	268.57
Time of Peak Inflow	01Jan2000, 11:56
Inflow Volume (AC - FT)	16.52
Maximum Storage (AC - FT)	10.93
Peak Elevation (FT)	954.43
Discharge Volume (AC - FT)	8.11

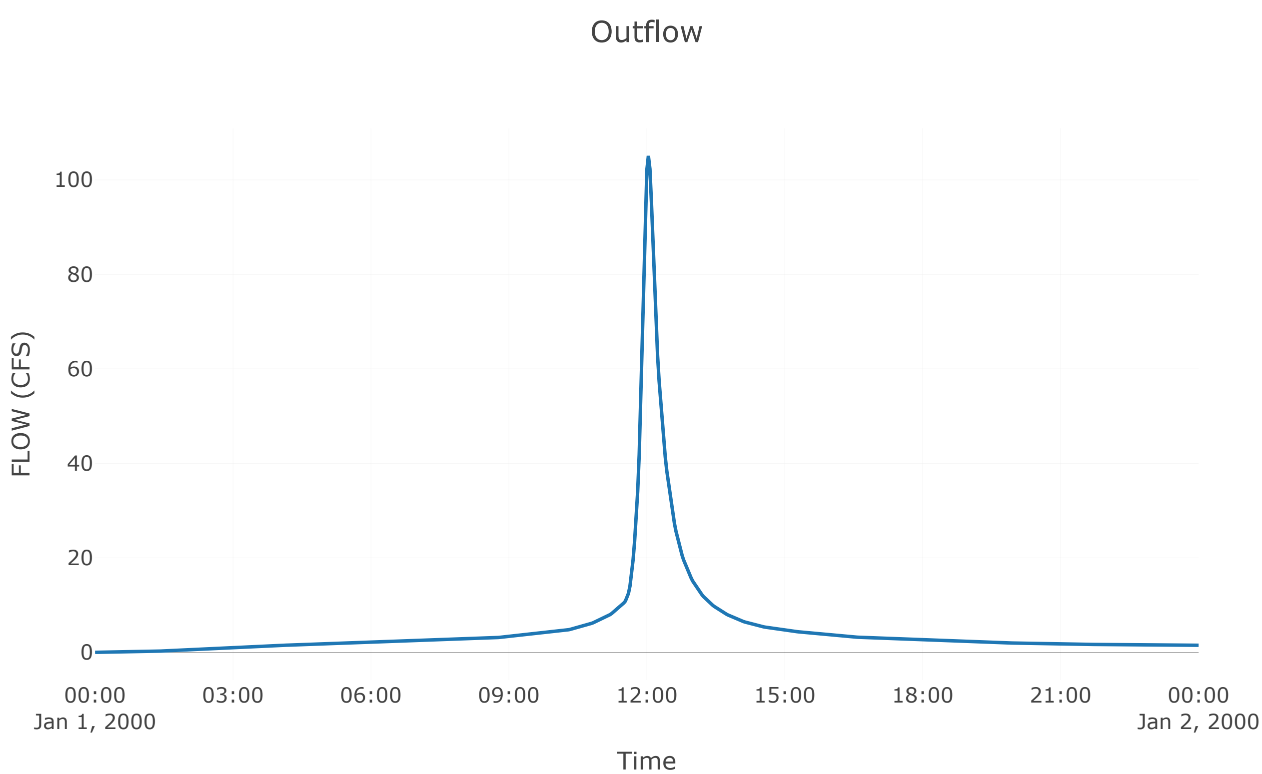


Reservoir: Reservoir H

Downstream : Reservoir J

Results: Reservoir H

Peak Discharge (CFS)	105.08
Time of Peak Discharge	01Jan2000, 12:02
Volume (IN)	13.16
Peak Inflow (CFS)	172.49
Time of Peak Inflow	01Jan2000, 11:56
Inflow Volume (AC - FT)	10.61
Maximum Storage (AC - FT)	6.33
Peak Elevation (FT)	947.43
Discharge Volume (AC - FT)	10.46



Subbasin: Section I

Area (ft²) : 0.02
Downstream : Reservoir I

Loss Rate: Scs

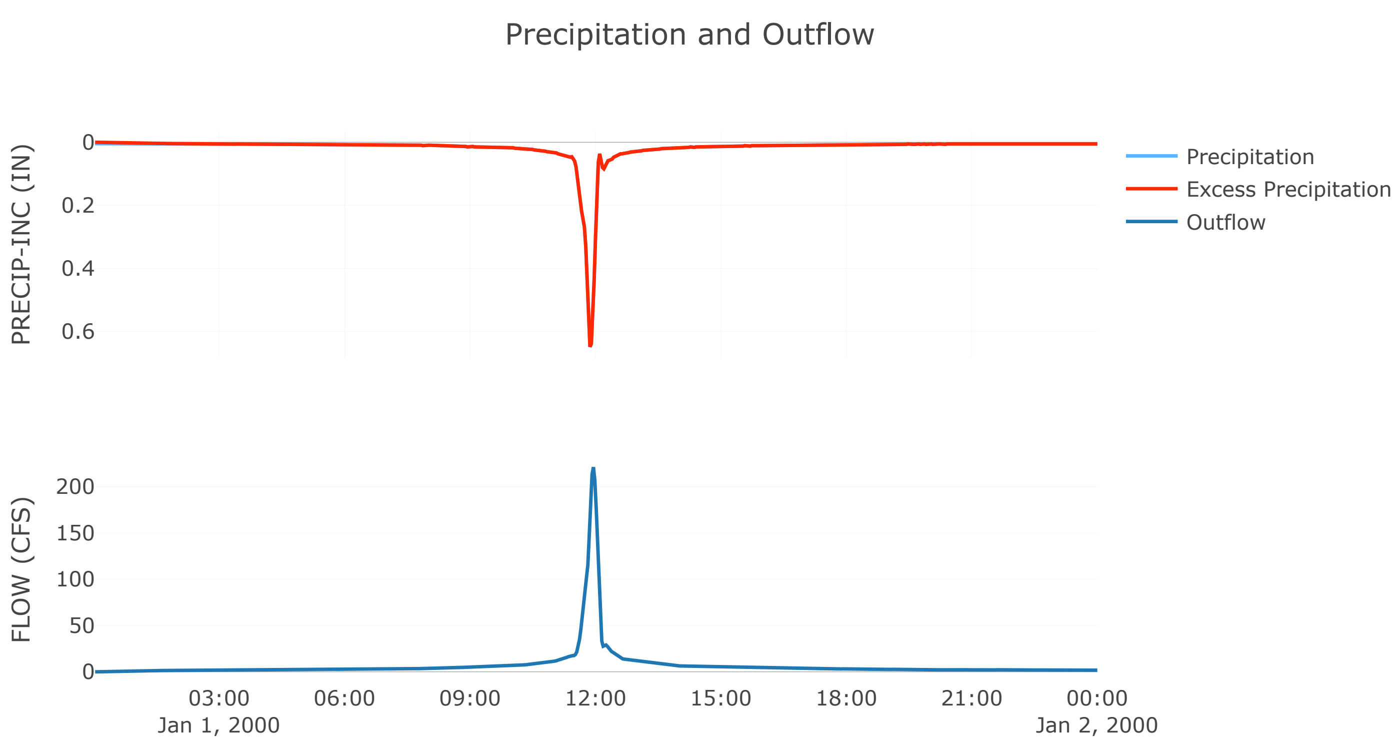
Percent Impervious Area	0
Curve Number	98

Transform: Scs

Lag	3
Unitgraph Type	Standard

Results: Section I

Peak Discharge (CFS)	221.11
Time of Peak Discharge	01Jan2000, 11:56
Volume (IN)	13.35
Precipitation Volume (AC - FT)	13.85
Loss Volume (AC - FT)	0.25
Excess Volume (AC - FT)	13.61
Direct Runoff Volume (AC - FT)	13.6
Baseflow Volume (AC - FT)	0

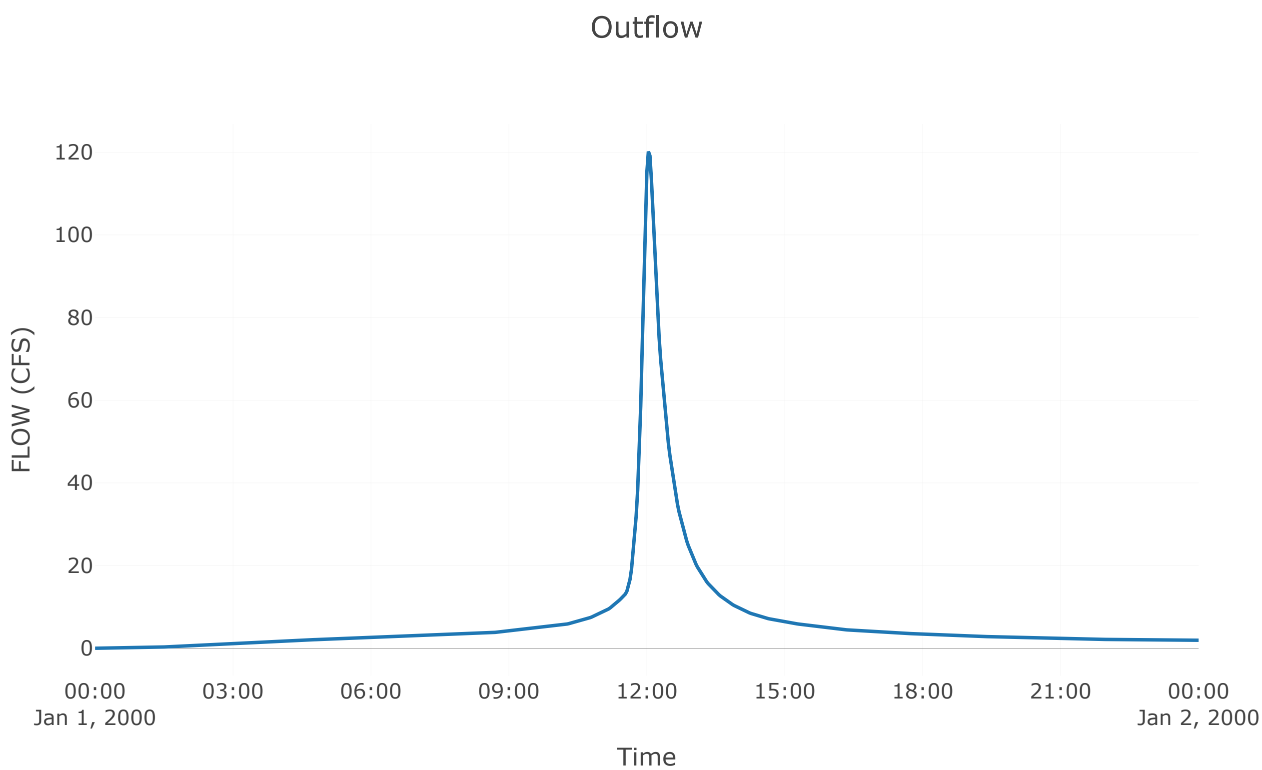


Reservoir: Reservoir I

Downstream : Reservoir J

Results: Reservoir I

Peak Discharge (CFS)	120.18
Time of Peak Discharge	01Jan2000, 12:02
Volume (IN)	13.12
Peak Inflow (CFS)	221.11
Time of Peak Inflow	01Jan2000, 11:56
Inflow Volume (AC - FT)	13.6
Maximum Storage (AC - FT)	18.95
Peak Elevation (FT)	946.47
Discharge Volume (AC - FT)	13.36

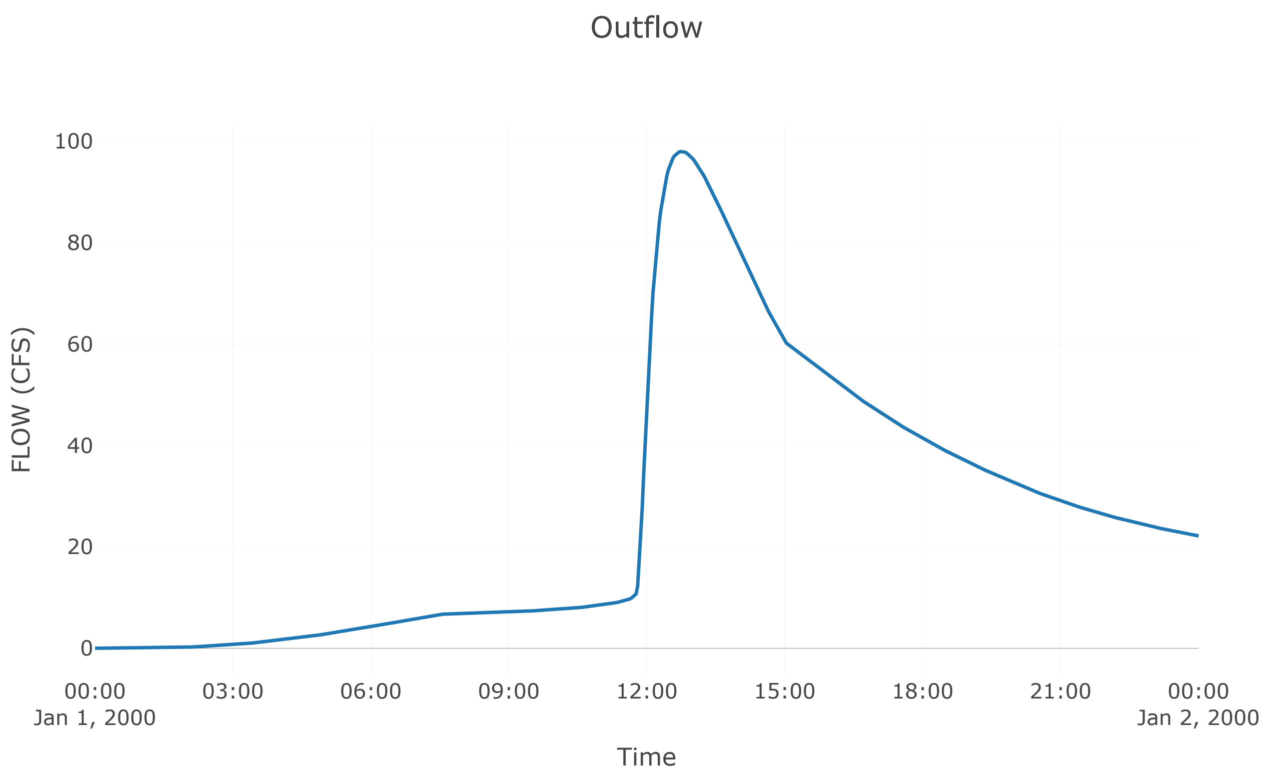


Reservoir: Reservoir J

Downstream : Outfall

Results: Reservoir J

Peak Discharge (CFS)	98.01
Time of Peak Discharge	01Jan2000, 12:46
Volume (IN)	8.25
Peak Inflow (CFS)	845.09
Time of Peak Inflow	01Jan2000, 11:56
Inflow Volume (AC - FT)	68.97
Maximum Storage (AC - FT)	34.02
Peak Elevation (FT)	931.31
Discharge Volume (AC - FT)	52.17



Sink: Outfall

Results: Outfall

Peak Discharge (CFS)	98.01
Time of Peak Discharge	01Jan2000, 12:46
Volume (IN)	8.25