INITIAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

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Possum Point Power Station CCR Surface Impoundments: Ponds ABC

Submitted To: Possum Point Power Station
19000 Possum Point Road
Dumfries, VA 22026

Submitted By: Golder Associates Inc.
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Richmond, VA 23227

April 2018 **Project No. 16-62150**

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Table of Contents

Tables

Figures

Appendices

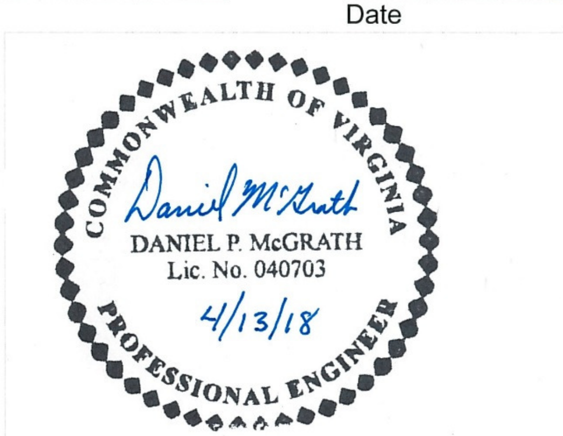
1.0 CERTIFICATION

This Initial Hazard Potential Classification Assessment for the Possum Point Power Station's Ponds ABC was prepared by Golder Associates Inc. (Golder). The document and Certification/Statement of Professional Opinion are based on and limited to information that Golder has relied on from Dominion Energy and others, but not independently verified, as well as work products produced by Golder.

On the basis of and subject to the foregoing, it is my professional opinion as a Professional Engineer licensed in the Commonwealth of Virginia that this document has been prepared in accordance with good and accepted engineering practices as exercised by other engineers practicing in the same discipline(s), under similar circumstances, at the same time, and in the same locale. It is my professional opinion that the document was prepared consistent with the requirements in §257.73(a)(2) of the United States Environmental Protection Agency's "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," published in the Federal Register on April 17, 2015, with an effective date of October 19, 2015 [40 CFR §257.73(a)(2)], as well as with the requirements in §257.100 resulting from the EPA's "Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Extension of Compliance Deadlines for Certain Inactive Surface Impoundments; Response to Partial Vacatur" published in the Federal Register on August 5, 2016 with an effective date of October 4, 2016 (40 CFR §257.100).

The use of the word "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion, and is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.

Daniel McGrath	Associate and Senior Consultant
Print Name	Title
Daniel McGrath	4/13/18
Signature	Date



2.0 INTRODUCTION

This analysis details the purpose, data sources, method of analysis, and development of a map showing the inundation level expected downstream during a breach event of Ponds ABC at the Possum Point Power Station. The inundation areas were compared with various map sources to determine what, if any, effect on downstream structures could be expected from a breach of the impounding structure. The results of this analysis show a breach of this impounding structure during a storm event has no downstream impacts to manmade structures. No loss of life is expected due to a failure of the structure. A *CCR Rule* hazard potential classification of **SIGNIFICANT** is recommended due to the potential environmental impacts of an impoundment failure.

3.0 PURPOSE

The purpose of this analysis is to recommend a hazard potential classification for the Ponds ABC dam at the Possum Point Power Station. Pursuant to 40 CFR §257.73, a CCR unit is classified as a Significant Hazard Potential where failure or mis-operation of the dam results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. The potential inundation zone downstream of the Ponds ABC dam does not contain occupied structures, nor is it regularly occupied by plant personnel.

Sources of data used in the analysis included:

1) United States Geological Survey (USGS) topographical map (Quantico quad sheet 2013);
2) Statistical rainfall data from NOAA Atlas 14 (NOAA's Precipitation Frequency Data Server);
3) Maps and aerial photos of area roads and structures from the Google Earth Pro;
4) Aerial survey of Ponds ABC, dated April 2017;
5) Flood map information from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel # 51153C0316E dated 08/03/2015 (Accessed through FEMA's National Flood Hazard Layer mapping system);
6) Web Soil Survey 2.1, Natural Resources Conservation Service (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm);
7) Hurricane Storm Surge Map, Virginia Department of Emergency Management (https://vdemgis.maps.arcgis.com/apps/PublicInformation/index.html?appid=3f72cc77421448ceb84312413a9e7dd0)

3.1 Description of the Impounding Structure

Ponds ABC is located in Dumfries, Virginia as a part of Dominion Energy Virginia's Possum Point Power Station (Station). It is located on the south side of Possum Point Road, adjacent to the Station and Quantico Creek. The Ponds ABC embankment is approximately 16 feet wide at the top, and has a top elevation of approximately 20 feet above mean sea level (AMSL). Ponds ABC typically maintain almost no standing water due to construction dewatering and evaporation. The upstream and downstream sideslopes are approximately 2:1. The downstream toe is approximately at elevation 6, giving an effective embankment height of 14 feet. The toe of the embankment is located at the limit of the 100-year floodplain. There are no occupied structures downstream of the dam.

This study has been developed based on the existing Ponds ABC topography as of April 2017. The primary outlet structure is a 4-ft by 4-ft square riser, fitted with stoplogs, that discharges through a 30-inch reinforced concrete pipe (RCP) into the adjacent Quantico Creek. There currently is no auxiliary spillway.

This report has been prepared with the hydraulic models depicting the existing grading and outlet pipe as described in this section.

3.2 Drainage Area and Hazard Analysis Area Descriptions

The drainage area for Ponds ABC consists of the pond area (assumed bare earth) and the surrounding wooded areas, which are presumed to be in good condition for purposes of determining a Runoff Curve Number (CN) as defined by the Natural Resource Conservation Service (NRCS). The soils in the drainage area are primarily Hydrologic Soil Group B. Table 1 below outlines the drainage areas and NRCS curve numbers used in this analysis.

Table 1: Ponds ABC Contributing Drainage Areas

Area Description	Area (acres)	CN
Ponds ABC Excavation	14.0	82
Ponds ABC DA (other)	26.6	60
Total Drainage Area	40.6	

3.3 Method of Analysis

To model the inflows into and out of the impoundment, a numerical model was created using the Hydraulic Engineering Center's Hydrologic Modeling System (HEC-HMS) Version 4.2.1 to generate the anticipated runoff hydrograph from the 24-hour, 1,000-year storm event. Table 2 outlines the resulting inflow and outflow for the non-breach scenario analysis.

Table 2: 1,000-Yr Storm Event and Flows

Storm Event	Rainfall (in)	Peak Inflow (cfs)	Peak Outflow (cfs)	Max water elevation (ft)	Inflow volume (ac-ft)
24-hr, 1,000-Yr	13.6	301.2	0.0	10.4	31.4

For the impounding structure failure analysis, the dam breach routine within HEC-HMS was used to model the failure event and produce the resulting outflow hydrograph. Input values were provided for the embankment geometry, stage-storage relationship, development time, and trigger elevation. The storm-related failure was triggered when the water level in the pond was at its peak.

Due to the simplicity of the downstream geometry, numerical modeling of the breach outflow was not performed. Instead, a general discharge map was generated. Due to the basin's proximity to Quantico Creek, the area downstream of the dam is subject to flooding from the 1% annual chance event (100-Yr event) and is classified as Zone AE on the Flood Insurance Rate Map (FIRM) (reference 6). The elevation given on the FIRM in the area of the basin (9 feet AMSL) indicates floodwater levels in Quantico Creek would not overtop the embankment. This is important to note since the storm event chosen for the spillway design flood (SDF) is of much larger magnitude than the 1% annual chance event that would likely cause this flooding in the proximity of the basin. The FIRM is included as Figure 2 of this report, and shows the approximate Station location. A breach of the basin is not anticipated to impact the Station.

3.4 Failure Analysis Scenarios

A breach simulation during the 1,000-year event was conducted to examine the potential downstream impacts of a possible impounding structure failure. The peak breach outflow in cubic feet per second (cfs) and the maximum high water level downstream was estimated using HEC-HMS. The breach failure at the 1,000-year event is assumed to be a piping failure through the embankment, not due to overtopping. A location in the southern embankment near the existing outfall was chosen as the breach location.

A “sunny day” breach is assumed to be due to piping of soils through the embankment when the water level in the reservoir is at its normal pool elevation; however, the typical normal pool is below the embankment toe, so this evaluation was not performed. A seismic analysis was not performed, nor were other sudden failure type scenarios considered as this evaluation is for the potential downstream impacts due to an embankment breach during the design storm event (1,000-yr event).

3.5 Hydraulic Modeling Results

The downstream flood models for the failure scenarios are presented in Table 3. Due to the small magnitude and short flow path for the breach events, detailed hydraulic modeling of the breach outflow was not performed.

Table 3: Summary of Peak Discharges, 1,000-yr Event

Scenario	Peak Discharge (cfs)	Outflow Volume (ac-ft)
No breach	0.0	0.0
Breach event	804.0	29.8

3.6 Downstream Consequences

The modeled embankment failure scenarios may cause erosion damage to the downstream side of the embankment leading to Quantico Creek. The effect of the inflow into Quantico Creek is anticipated to be minimal due to the short duration of the flow event, the expected water elevation in the creek, and the relatively small volume of the breach flow in comparison to the normal volume of flow in the creek.

3.7 Spillway Adequacy

If a structural embankment failure does not occur, the existing outlet structure will contain the 1,000-yr event. At its peak during the 1,000-year event, the basin has approximately 9.6 feet of freeboard.

4.0 CONCLUSIONS AND RECOMMENDATION

Ponds ABC are inactive, existing CCR surface impoundments under the *Disposal of Coal Combustion Residuals from Electric Utilities* final rule (CCR rule). Pursuant to 40 CFR §257.73, a CCR unit is classified as a Significant Hazard Potential where failure or mis-operation of the dam results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. As determined in this Study, failure or mis-operation of the dam would be unlikely to result in loss of human life. A hazard classification potential of **SIGNIFICANT** is assigned.

APPENDIX A - Figures

Figure 1 –1,000-Yr Event Breach Flow
Figure 2 – 100-Yr Flood Map (FIRM)

CLIENT
DOMINION ENERGY
POSSUM POINT POWER STATION

PROJECT
INACTIVE POND CCR DEMONSTRATION
HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

CONSULTANT

Golder Associates

YYYY-MM-DD	2018-02-01
DESIGNED	KAL
PREPARED	KAL
REVIEWED	DPM
APPROVED	

TITLE
POND ABC BREACH STUDY
1,000-YEAR, 24-HOUR STORM

PROJECT NO. 16-62150
REV.
FIG 1

Path: G:\Projects\Dominion\Possum Point\166-2150 Engineering\CCR Inactive Demonstrations\Calcs\Breach Map.dwg

1 in
0
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

National Flood Hazard Layer FIRMette

FEMA

38°32'49.59"N

77°17'21.52"W

77°16'42.56"W

38°32'20.32"N

0 250 500 1,000 1,500 2,000 Feet

1:6,241.13

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99*
	With BFE or Depth
	Regulatory Floodway *Zone AE, AO, AH, VE, AR*
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X*
	Effective LOMRs
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
MAP PANELS	Digital Data Available
	No Digital Data Available
	Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/7/2018 at 11:30:33 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 2

APPENDIX B

Hydraulic Modeling Analysis

Date:	February 7, 2018	**Made by:**	KAL
Project No.:	16-62150	**Checked by:**	SDRM
Subject:	PPPS Ponds ABC Breach Analysis	**Reviewed by:**	DPM

Project: **POSSUM POINT POWER STATION PONDS ABC – EXISTING CONDITION**

This purpose of this evaluation is to determine the hydraulic performance of the existing Ponds ABC CCR impoundment at the Possum Point Power Station (PPPS) during the 1,000-year storm and an associated embankment breach event. This evaluation is in support of the “Significant” hazard potential classification as defined in §257.53 of the *CCR Rule*.

1.0 CALCULATIONS

1.1 Pond Storage Volume

The Ponds ABC storage volume was computed based on the existing conditions as surveyed in April 2017 as excavated and visually clean of CCR material. The maximum available storage in the ponds is 117.5 acre-feet at elevation 20.0, with overtopping occurring above elevation 20.0. Attachment 1 contains the stage storage rating table used in the HMS model.

1.2 Outlet Design and Capacity

The existing Ponds ABC outfall structure consists of a rectangular riser box fitted with stoplogs to adjust the pond’s permanent pool. The riser discharges through a 30-inch reinforced concrete pipe (RCP). For this analysis, the ponds were conservatively evaluated with a permanent pool at elevation 0.0 ft (approximately 3.7 ft of water) and no discharge through the riser structure.

1.3 Storm Routing Calculations

Analysis of the Ponds ABC stormwater system was performed using the US Army Corps of Engineers Hydrologic Engineering Center’s Hydraulic Modeling System (HEC-HMS) software package (ref #1). The direct drainage area to the ponds is 40.6 acres. The predominant soil types in the area are Hydrologic Soil Group (HSG) B soils.

Per §257.82(a)(3)(ii), the impoundments are required to adequately manage flow resulting from the 1,000-Yr storm event. The 24-hour, 1,000-Yr storm event precipitation amount was obtained from the Precipitation Frequency Data Server (PFDS, ref #2) for Dumfries, Virginia, as 13.6 inches.

Modeling of the existing Ponds ABC for the 1,000-year event during a non-breach scenario shows the calculated high water elevation to be 10.4 feet, which indicates the ponds do not overtop the embankment. As such, the breach event was modeled as a piping-type failure. The breach location was chosen to be in the southern embankment near the outfall structure. From this location, the released water will flow directly into Quantico Creek.

The embankment breach subroutine within HEC-HMS was used to simulate an embankment breach and calculate the resulting outflow. Parameters for embankment geometry, material properties, breach geometry, and development time were established, and the breach event was set to occur when the pond was near its maximum pool elevation (el. 10.1 feet).

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Figure 1 illustrates the connectivity of the stormwater elements and the data inputs as modeled in HEC-HMS.

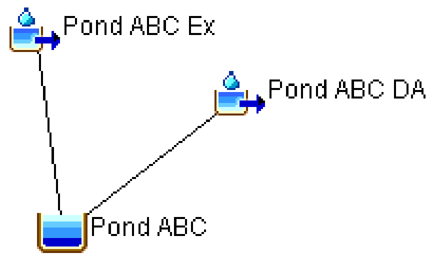


Figure 1 – PPPS Ponds ABC HEC-HMS Model

The following table summarizes the results of the HEC-HMS analysis for the 1,000-Yr storm event.

Table 1: PPPS Ponds ABC HEC-HMS Output

Scenario	Peak Inflow (cfs)	Peak Discharge (cfs)	Outflow Volume (ac-ft)
1,000-yr event, no breach	301.2	0.0	0.0
1,000-yr event, with breach	301.2	804.0	29.8

2.0 OUTFLOW MODELING

Due to the simple breach geometry and relatively short downstream distance to the 100-yr floodplain, a detailed numerical model of the breach flow was not conducted. The extents of the outflow were estimated based on the anticipated breach geometry and the downstream topography.

3.0 REFERENCES

1) U.S. Army Corps of Engineers Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) release 4.2.1
2) Precipitation Frequency Data Server (NOAA Atlas 14) https://hdsc.nws.noaa.gov/hdsc/pfds/

4.0 ATTACHMENTS

1) Stage-Storage Table
2) Outlet Discharge
3) HEC-HMS

Ponds ABC Stage-Storage Table

Elevation	Area		Volume		Cumulative Volume		
(ft)	(sqft)	(acres)	(cuft)	(CY)	(CY)	(cuft)	(ac-ft)
20.00	476451.1	10.938	465179.08	17228.85	189550.15	5117854	117.49
19.00	453997.4	10.422	443364.94	16420.92	172321.29	4652675	106.81
18.00	432816.8	9.936	424957.17	15739.15	155900.37	4209310	96.63
17.00	417145.7	9.576	408225.28	15119.45	140161.22	3784353	86.88
16.00	399369.4	9.168	390036.01	14445.78	125041.76	3376128	77.51
15.00	380776.5	8.741	371786.75	13769.88	110595.98	2986092	68.55
14.00	362868.9	8.330	355263.86	13157.92	96826.10	2614305	60.02
13.00	347712.7	7.982	340816.74	12622.84	83668.18	2259041	51.86
12.00	333966.9	7.667	307828.51	11401.06	71045.34	1918224	44.04
11.00	282410.1	6.483	267426.52	9904.69	59644.28	1610396	36.97
10.00	252717.8	5.802	240154.99	8894.63	49739.60	1342969	30.83
9.00	227807.6	5.230	214764.61	7954.24	40844.97	1102814	25.32
8.00	201980.5	4.637	189733.98	7027.18	32890.72	888050	20.39
7.00	177745.5	4.080	162850.36	6031.49	25863.54	698316	16.03
6.00	148396.3	3.407	137395.04	5088.71	19832.05	535465	12.29
5.00	126680.0	2.908	112761.64	4176.36	14743.34	398070	9.14
4.00	99394.2	2.282	73262.97	2713.44	10566.98	285309	6.55
3.00	49940.5	1.146	47051.52	1742.65	7853.54	212046	4.87
2.00	44220.5	1.015	41366.67	1532.10	6110.89	164994	3.79
1.00	38577.0	0.886	35973.36	1332.35	4578.79	123627	2.84
0.00	33431.1	0.767	30512.84	1130.11	3246.45	87654	2.01
-1.00	27684.9	0.636	25183.87	932.74	2116.34	57141	1.31
-2.00	22763.1	0.523	20525.54	760.21	1183.60	31957	0.73
-3.00	18366.5	0.422	11431.79	423.40	423.40	11432	0.26
-3.70	14377.0	0.330	-	-	-	-	-

Basin Elevations		
Invert	-3.7	ft
Embankment	20	ft

1. Dewatering Device		
Type:	[None]	
Invert		ft
Width		in
Cd (orifice)	0.6	
Cw (weir)	3.33	
Orifice Area	0.00	ft2
Multiple Rows? (Y or N)		N

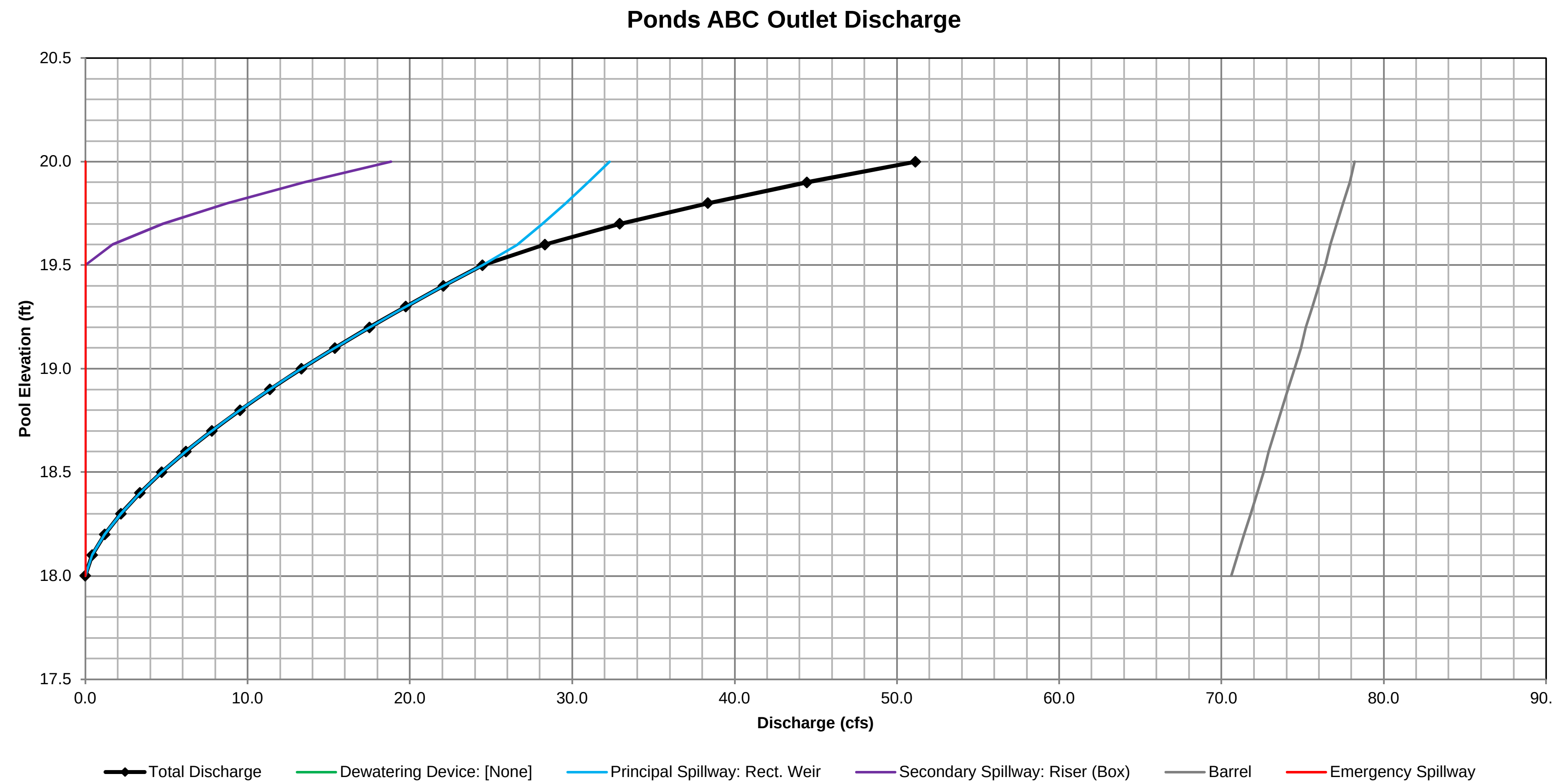
2. Principal Spillway		
Type:	Rect. Weir	
Crest	18	ft
Width	48	in
Cd (orifice)	0.6	
Cw (weir)	3.33	
Orifice Area	6.00	ft2
Number of Spillways:		1

3. Secondary Spillway		
Type:	Riser (Box)	
Connect to PS?	Yes	
Crest	19.5	ft
Width	48	in
Cd (orifice)	0.6	
Cw (weir)	3.33	
Riser Area	16.00	ft2
Number of Spillways:		1

4. Discharge Pipe		
Invert	8	ft/ft
Diameter	30	in
Slope	0.0167	ft/ft
Length	60	ft/ft
Material	RCP	
Manning n	0.013	

out=3

5. Emergency Spillway		
B. Width	100	ft
Side Slope	10	:1
Invert	20	ft
Top Width	100	ft



Min. Elev.	18	ft
Interval	0.1	ft

Water Elevation	Inlet-Controlled Discharge															Outlet-Controlled Discharge					Depth	Total Discharge
	Dewatering Device: [None]					Principal Spillway: Rect. Weir					Secondary Spillway: Riser (Box)					Barrel-Controlled Discharge	Controlling Condition	Actual Discharge	Emergency Spillway			
	Head	Discharge			Controlling Discharge	Head	Discharge		Controlling Condition	Controlling Discharge	Head	Discharge		Controlling Condition	Controlling Discharge				Head	Discharge		
		Skimmer	Orifice	Weir			Orifice	Weir				Orifice	Weir									
(ft)	(ft)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(cfs)	(cfs)		(cfs)	(ft)	(cfs)	(cfs)		(cfs)	(cfs)		(cfs)	(ft)	(cfs)	(ft)	(cfs)
18.00					0.00	0.00		0.00	Weir	0.00					0.00	70.60	Inlet	0.00	0	0.00	**21.70**	**0.00**
18.10					0.00	0.10		0.42	Weir	0.42					0.00	71.00	Inlet	0.42	0	0.00	**21.80**	**0.42**
18.20					0.00	0.20		1.19	Weir	1.19					0.00	71.40	Inlet	1.19	0	0.00	**21.90**	**1.19**
18.30					0.00	0.30		2.19	Weir	2.19					0.00	71.80	Inlet	2.19	0	0.00	**22.00**	**2.19**
18.40					0.00	0.40		3.37	Weir	3.37					0.00	72.20	Inlet	3.37	0	0.00	**22.10**	**3.37**
18.50					0.00	0.50		4.71	Weir	4.71					0.00	72.60	Inlet	4.71	0	0.00	**22.20**	**4.71**
18.60					0.00	0.60		6.19	Weir	6.19					0.00	72.90	Inlet	6.19	0	0.00	**22.30**	**6.19**
18.70					0.00	0.70		7.80	Weir	7.80					0.00	73.30	Inlet	7.80	0	0.00	**22.40**	**7.80**
18.80					0.00	0.80		9.53	Weir	9.53					0.00	73.70	Inlet	9.53	0	0.00	**22.50**	**9.53**
18.90					0.00	0.90		11.37	Weir	11.37					0.00	74.10	Inlet	11.37	0	0.00	**22.60**	**11.37**
19.00					0.00	1.00		13.32	Weir	13.32					0.00	74.50	Inlet	13.32	0	0.00	**22.70**	**13.32**
19.10					0.00	1.10		15.37	Weir	15.37					0.00	74.90	Inlet	15.37	0	0.00	**22.80**	**15.37**
19.20					0.00	1.20		17.51	Weir	17.51					0.00	75.20	Inlet	17.51	0	0.00	**22.90**	**17.51**
19.30					0.00	1.30		19.74	Weir	19.74					0.00	75.60	Inlet	19.74	0	0.00	**23.00**	**19.74**
19.40					0.00	1.40		22.06	Weir	22.06					0.00	76.00	Inlet	22.06	0	0.00	**23.10**	**22.06**
19.50					0.00	1.50	25.02	24.47	Weir	24.47	0.00	0.00	0.00	Weir	0.00	76.40	Inlet	24.47	0	0.00	**23.20**	**24.47**
19.60					0.00	1.60	26.64	26.96	Orifice	26.64	0.10	24.36	1.68	Weir	1.68	76.70	Inlet	28.32	0	0.00	**23.30**	**28.32**
19.70					0.00	1.70	28.16	29.52	Orifice	28.16	0.20	34.45	4.77	Weir	4.77	77.10	Inlet	32.92	0	0.00	**23.40**	**32.92**
19.80					0.00	1.80	29.60	32.17	Orifice	29.60	0.30	42.20	8.75	Weir	8.75	77.50	Inlet	38.36	0	0.00	**23.50**	**38.36**
19.90					0.00	1.90	30.98	34.88	Orifice	30.98	0.40	48.72	13.48	Weir	13.48	77.90	Inlet	44.46	0	0.00	**23.60**	**44.46**
20.00					0.00	2.00	32.30	37.67	Orifice	32.30	0.50	54.48	18.84	Weir	18.84	78.20	Inlet	51.14	0	0.00	**23.70**	**51.14**

Ponds ABC HEC-HMS (Dam Breach)

Drainage Area	Area (ac)	CN	Lag Time (min)
Pond ABC Ex	14.0	82	9.8
Pond ABC DA	26.6	60	23.0

Breach Parameters

Basin Name: PP D

Element Name: Pond ABC (breach)

Method:	Piping Breach
Direction:	Main
*Top Elevation (FT)	20
*Bottom Elevation (FT)	0
*Bottom Width (FT)	10
*Left Slope (xH:1V)	1
*Right Slope (xH:1V)	1
*Piping Elevation (FT)	6
*Piping Coefficient:	0.8
*Development Time (HR)	0.5
Trigger Method:	Elevation
*Trigger Elevation (FT)	10.14
Progression Method:	Linear

Project: PP D Pond   Simulation Run: 1000-Yr, 24-hour
Reservoir: Pond ABC (breach)

Start of Run:	17Apr2017, 00:00	Basin Model:	PP D
End of Run:	20Apr2017, 00:01	Meteorologic Model:	1000-Yr
Compute Time:	13Feb2018, 13:45:10	Control Specifications:	72-Hr

Volume Units: ◯ IN ◉ AC-FT

Computed Results

Peak Inflow:	301.19 (CFS)	Date/Time of Peak Inflow:	17Apr2017, 12:05
Peak Discharge:	804.02 (CFS)	Date/Time of Peak Discharge:	18Apr2017, 01:04
Inflow Volume:	31.44 (AC-FT)	Peak Storage:	29.70 (AC-FT)
Discharge Volume:	29.77 (AC-FT)	Peak Elevation:	10.14 (FT)

Project: PP D Pond   Simulation Run: 1000-Yr, 24-hour
Reservoir: Pond ABC (non-breach)

Start of Run:	17Apr2017, 00:00	Basin Model:	PP D
End of Run:	20Apr2017, 00:01	Meteorologic Model:	1000-Yr
Compute Time:	DATA CHANGED, RECOMPUTE	Control Specifications:	72-Hr

Volume Units: ◯ IN ◉ AC-FT

Computed Results

Peak Inflow:	301.19 (CFS)	Date/Time of Peak Inflow:	17Apr2017, 12:05
Peak Discharge:	0.00 (CFS)	Date/Time of Peak Discharge:	17Apr2017, 00:00
Inflow Volume:	31.44 (AC-FT)	Peak Storage:	31.44 (AC-FT)
Discharge Volume:	0.00 (AC-FT)	Peak Elevation:	10.39 (FT)

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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