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October 13, 2021

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
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Subject: USEPA CCR Rule and IEPA Part 845 Rule Applicability Cross-Reference
2021 USEPA CCR Rule Periodic Certification Report
Bottom Ash Pond, Baldwin Power Plant, Baldwin, Illinois

At the request of Dynegy Midwest Generation, LLC (Dynegy), Geosyntec Consultants (Geosyntec) has prepared this letter to document how the attached 2021 United States Environmental Protection Agency (USEPA) CCR Rule Periodic Certification Report (Report) was prepared in accordance with both the Federal USEPA CCR Rule[1] and the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 Rule[2]. Specific sections of the report and the applicable sections of the USEPA CCR Rule and Illinois Part 845 Rule are cross-referenced in **Table 1**. A certification from a Qualified Professional Engineer for each of the CCR Rule sections listed in **Table 1** is provided in Section 9 of the attached Report. This certification statement is also applicable to each section of the Part 845 Rule listed in **Table 1.**

Table 1 – USEPA CCR Rule and Illinois Part 845 Rule Cross-Reference

Report Section	USEPA CCR Rule		Illinois Part 845 Rule	
3	§257.73 (a)(2)	Hazard Potential Classification	845.440	Hazard Potential Classification Assessment[3]
4	§257.73 (c)(1)	History of Construction	845.220(a)	Design and Construction Plans (Construction History)
5	§257.73 (d)(1)	Structural Stability Assessment	845.450 (a) and (c)	Structural Stability Assessment
6	§257.73 (e)(1)	Safety Factor Assessment	845.460 (a-b)	Safety Factor Assessment
7	§257.82 (a)(1-3)	Adequacy of Inflow Design Control System Plan	845.510(a), (c)(1), (c)(3)	Hydrologic and Hydraulic Capacity Requirements / Inflow Design Flood Control System Plan
	§257.82 (b)	Discharge from CCR Unit	845.510(b)	Discharge from CCR Surface Impoundment

[1] United Stated Environmental Protection Agency, 2015. *40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule.*
[2] State of Illinois, Joint Committee on Administrative Rule, Administrative Code (2021). *Title 35: Environmental Protection, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter j: Coal Combustion Waste Surface Impoundment, Part 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments.*
[3] "Significant" and "High" hazard, per the CCR Rule[1], are equivalent to Class II and Class I hazard potential, respectively, per Part 845[2].

CLOSING

This letter has been prepared to demonstrate that the content and Qualified Professional Engineer Certification of the 2021 Periodic USEPA CCR Rule Certification Report fulfills the corresponding requirements of Part 845 of Illinois Administrative Code listed in **Table 1**.

Sincerely,

Thomas Ward, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

2021 USEPA CCR RULE PERIODIC CERTIFICATION REPORT
§257.73(a)(2), (c), (d[1]), (e) and §257.82
BOTTOM ASH POND
Baldwin Power Plant
Baldwin, Illinois

Submitted to

Dynegy Midwest Generation, LLC

1500 Eastport Plaza Drive
Collinsville, Illinois 62234

Submitted by

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October 13, 2021

[1] Except for §257.73(d)(1)(vi).

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EXECUTIVE SUMMARY

This Periodic United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule [1] certification report (Periodic Certification Report) for the Bottom Ash Pond (BAP) at the Baldwin Power Plant (BPP)[2] has been prepared in accordance with Rule 40, Code of Federal Regulations (CFR) §257, herein referred to as the "CCR Rule" [1]. The CCR Rule requires that initial certifications for existing CCR surface impoundments, completed in 2016 and subsequently posted on Dynegy Midwest Generation, LLC (DMG) CCR Website ([2], [3], [4], [5], [6], [7]) be updated on a five-year basis.

The initial certification reports developed in 2016 and 2017 were independently reviewed by Geosyntec ([2], [3], [4], [5], [6], [7], [8], [9]). Additionally, field observations, interviews with plant staff, updated engineering analyses, and evaluations were performed to compare conditions in 2021 at the BAP relative to the 2016 and 2017 initial certifications. These tasks determined that updates are not required for the Initial Hazard Potential Classification. However, due to changes at the site and technical review comments, updates were required and were performed for the:

- History of Construction Report,
- Initial Structural Stability Assessment,
- Initial Safety Factor Assessment, and
- Initial Inflow Design Flood Control System Plan.

Geosyntec's evaluations of the initial certification reports and updated analyses identified that the BAP meets all requirements for hazard potential classification, history of construction reporting, structural stability assessment, safety factor assessment, and inflow design flood control system plan with the exception of the structural integrity of hydraulic structures (§257.73(d)(1)(vi)), which was not included in the scope of this report. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

[2] The BAP is also referred to as ID Number W1578510001-06, Bottom Ash Pond by the Illinois Environmental Protection Agency (IEPA); CCR unit ID 601 by DMG; and IL50721 within the National Inventory of Dams (NID) maintained by the Illinois Department of Natural Resources (IDNR). Within this document it is referred to as the BAP.

Table 1 – Periodic Certification Summary

			2016 Initial Certification		2021 Periodic Certification	
	CCR Rule Reference	**Requirement Summary**	**Requirement Met?**	**Comments**	**Requirement Met?**	**Comments**
Hazard Potential Classification						
3	§257.73(a)(2)	Document hazard potential classification	Yes	Impoundment was determined to have Significant hazard potential classification [2].	Yes	No changes were identified that may affect this requirement.
History of Construction						
5	§257.73(c)(1)	Compile a history of construction	Yes	A history of Construction report was prepared for the BAP [4].	Yes	A letter listing updates to the History of Construction report is provided in **Attachment C**.
Structural Stability Assessment						
6	§257.73(d)(1)(i)	Stable foundations and abutments	Yes	Foundations and abutments were found to be stable [9].	Yes	Foundations and abutments were found to be stable after performing updated slope stability analyses.
	§257.73(d)(1)(ii)	Adequate slope protection	Yes	Slope protection was adequate [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iii)	Sufficiency of dike compaction	Yes	Dike compaction was sufficient for expected ranges in loading conditions [9].	Yes	Dike compaction was found to be sufficient after performing updated slope stability analyses.
	§257.73(d)(1)(iv)	Presence and condition of slope vegetation	Yes	Vegetation was present on exterior and interior slopes and is maintained.) [9].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(v)(A) and (B)	Adequacy of spillway design and management	Yes	Spillways were adequately designed and constructed and were expected to adequately manage flow during 1,000-year flood [9].	Yes	Spillways were found to be adequately designed and constructed and are expected to adequately manage flow during the 1,000-year flood, after performing updated hydrologic and hydraulic analyses.
	§257.73(d)(1)(vi)	Structural integrity of hydraulic structures	Yes	Two CCTV inspections were performed. Overall, the investigation found the HDPE outflow pipe to be free of deterioration and deformation, and that deterioration. Operational and maintenance procedures are appropriate for maintaining the spillway. This inspection was approved via the full certification report [9].	Periodic certification of §257.73(d)(1)(vi) was not included in the scope of this report.	
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Not Applicable	Inundation of exterior slopes was not expected; this requirement was not applicable [9].	Not Applicable	No changes were identified that may affect this requirement.
Safety Factor Assessment						
7	§257.73(e)(1)(i)	Maximum storage pool safety factor must be at least 1.50	Yes	Safety factors were calculated to be 2.04 [6].	Yes	Safety factors from updated slope stability analyses were calculated to be 2.04.
	§257.73(e)(1)(ii)	Maximum surcharge pool safety factor must be at least 1.40	Yes	Safety factors were calculated to be 2.04 [6].	Yes	Safety factors from updated slope stability analyses were calculated to be 2.04.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 1.44 [6].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.45.
	§257.73(e)(1)(iv)	For dike construction of soils that have susceptible to liquefaction, safety factor must be at least 1.20	Not Applicable	Dike soils were not susceptible to liquefaction [6].	Not Applicable	No changes were identified that may affect this requirement.
Inflow Design Flood Control System Plan						
8	§257.82(a)(1), (2), (3)	Adequacy of inflow design control system plan.	Yes	Flood control system adequately managed inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood [9].	Yes	The flood control system was found to adequately manage inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood, after performing updated hydrologic and hydraulic analyses.
	§257.82(b)	Discharge from CCR Unit	Yes	Discharges from the BAP was routed through a NPDES-permitted outflow during both normal and 1,000-eyar, 24-hour Inflow Design Flood conditions [7].	Yes	Discharges from the BAP was routed through a NPDES-permitted outflow during both normal and 1,000-eyar, 24-hour Inflow Design Flood conditions.

SECTION 1

INTRODUCTION AND BACKGROUND

This Periodic United States Environmental Protection Agency (USPA) Coal Combustion Residual (CCR) Rule [1] Certification Report was prepared by Geosyntec Consultants (Geosyntec) for Dynegy Midwest Generation, LLC (Dynegy) to document the periodic certification of the Bottom Ash Pond (BAP) at the Baldwin Power Plant (BPP), also known as the Baldwin Energy Complex (BEC)< located at 10901 Baldwin Rd in Baldwin, Illinois, 62217. The location of Baldwin Power Plant is provided in **Figure 1**, and a site plan showing the location of the BAP and the closed Fly Ash Pond System (FAPS), is provided in **Figure 2**. FAPS consists of the West Fly Ash Pond, Old East Ash Pond, and East Ash Pond (WFAP, OEAP, and EAP).

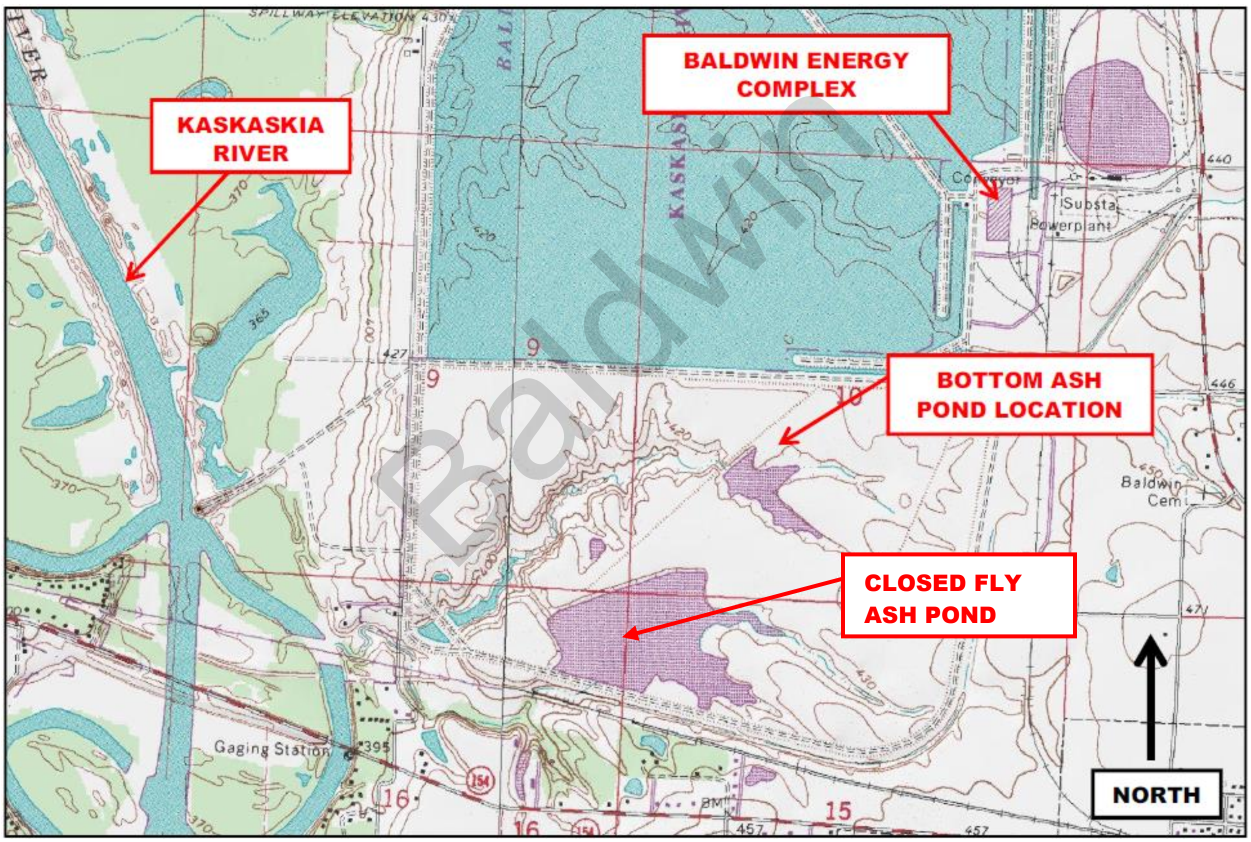


Figure 1 – Baldwin Power Plant Location Map (adapted from AECOM, 2016)

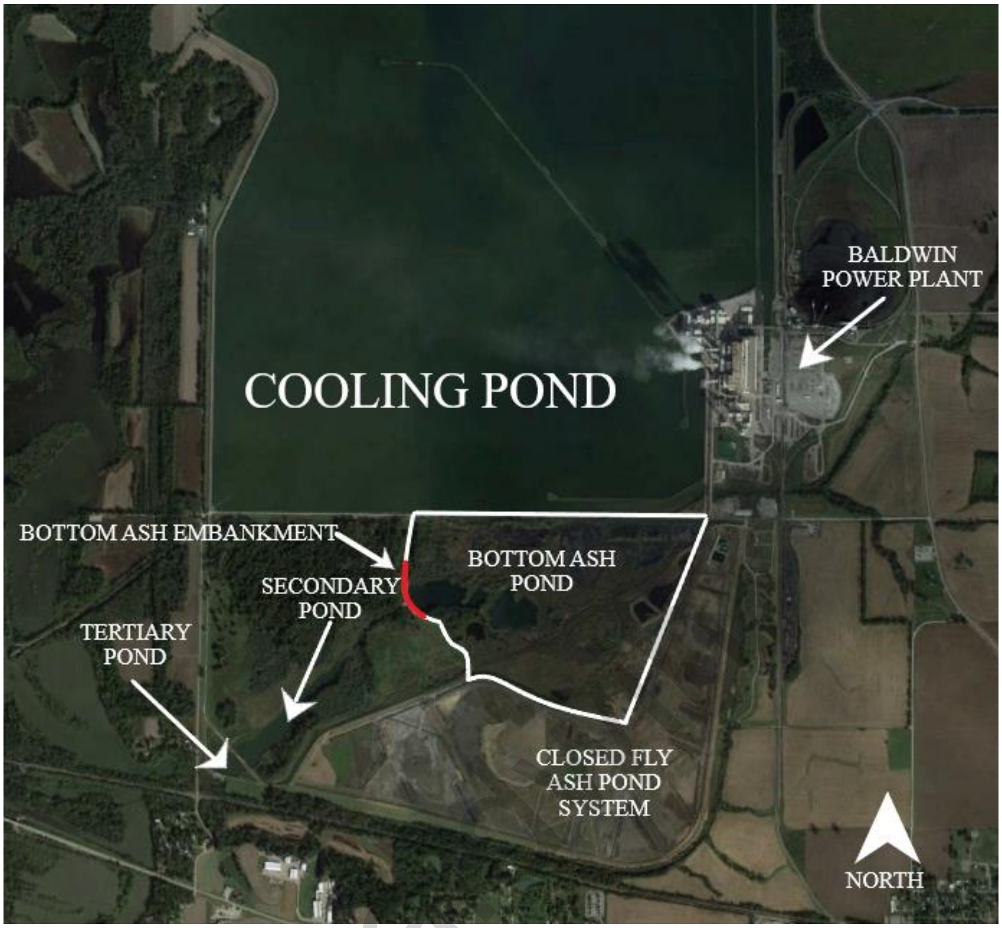


Figure 2 – Baldwin Power Plant Site Plan (adapted from Google Earth Pro, October, 2018)

1.1 BAP Description

The BAP serves as the primary wet impoundment for sluiced bottom ash, stacked fly ash, and other non-CCR wastewaters produced by the Baldwin Power Plant. Ash within Baldwin Power Plant is produced via three power units (U1, U2, and U3). The limits of the BAP, as well as the BAP embankment, are shown on **Figure 2**.

The BAP has three separate spillway/outfall structures: a riser pipe and drop inlet spillway used during normal operations, and a pump station and an emergency overflow spillway, which are used during high water conditions. Under normal conditions, clear water discharge from the BAP was routed through a 30-inch diameter, high-density polyethylene (HDPE) riser pipe and drop inlet spillway, with an invert elevation of 414.8 ft, to the non-CCR Secondary Pond. The Secondary Pond then drains to the non-CCR Tertiary Pond and ultimately to the Kaskaskia River via the site's NPDES- permitted outfall, which is located beyond the Tertiary Pond [9]. The BAP discharge pipe is installed at a 0.5% slope within the BAP embankment, with seepage collars. A metal walkway structure and debris screen are located directly over the invert of the riser.

The BAP is also fitted with an emergency pumping station, which was made to divert clear water from the impoundment to the Cooling Pond (a non-CCR surface impoundment) north of the BAP during heavy rainfall events [9]. The pumping station contains four pumps, two of which turn on at elevation 417.4 ft and two of which turn on at elevation 417.6 ft. The pumps turn off again when the water level in the impoundment drops to 417.2 ft. These pumps have the capacity to divert clear water to the Cooling Pond at a rate of approximately 12,350 gallons per minute. A portion of the BAP embankment crest also serves as a riprap-lined emergency spillway with a bottom width of 36 ft and an invert elevation of 417.7 ft.

The majority of the BAP interior, which is approximately 175 acres in size, is covered with stacked bottom ash and vegetation. Several interior ponding areas exist within the footprint of the BAP, but all drain to and are ultimately impounded by the BAP embankment. As currently operated, the maximum operating pool elevation of the BAP is 415.2 ft, as controlled by the spillway and plant process flow volume into the BAP. The crest length of the BAP embankment is approximately 450 ft, and the crest elevation ranges from a minimum of 417.7 ft at the emergency spillway to a maximum of 421 ft at the right abutment. Outside of the emergency spillway, the minimum crest elevation is 420.0 ft. The crest width of the embankment is approximately 30 ft and the crest height is up to 20 ft above the surrounding grade. The upstream slopes have orientations ranging from 1H:1V (horizontal to vertical) to 4H:1V and the downstream slopes have a typical orientation of 3H:1V.

Initial certifications for the BAP for Hazard Potential Classification (§257.73(a)(2)), History of Construction (§257.73(c)), Structural Stability Assessment (§257.73(d)), Safety Factor Assessment (§257.73(e)(1)), and Inflow Design Flood Control System Plan (§257.82) were completed by Stantec and AECOM in 2016 and 2017 and subsequently posted to DMG's CCR Website ([2], [3], [4], [5], [6], [7]). Additional documentation for the initial certifications included a detailed operating record reports containing calculations and other information prepared for the hazard potential classification by Stantec [8] and for the structural stability assessment, safety factor assessment, and inflow design flood control system plan by AECOM [9]. These operating record reports were not posted to DMG's CCR Website.

1.2 Report Objectives

These following objectives are associated with this report:

- Compare site conditions from 2015/2016, when the initial certifications were developed, to site conditions in 2020/2021, when data for the periodic certification was obtained, and evaluate if updates are required to the:
    - §257.73(a)(2) Hazard Potential Classification [2];
    - §257.73(c) History of Construction [4];
    - §257.73(d) Structural Stability Assessment [5];
    - §257.73(e) Safety Factor Assessment [6], and/or

  - §257.82 Inflow Design Flood Control System Plan [7].

- Independently review the Hazard Potential Classification ([2], [8]), Emergency Action Plan [3], Structural Stability Assessment ([5], [9]), Safety Factor Assessment ([6], [9]), and Inflow Design Flood Control System Plan ([7], [9]) reports to determine if updates may be required based on technical considerations.

  - The History of Construction report [4] was not independently reviewed for technical considerations, as this report contained historical information primarily developed prior to promulgation of the CCR Rule [1] for the CCR units at Baldwin Power Plant , and did not include calculations or other information used to certify performance and/or integrity of the impoundments under §257.73(a)(2)-(3), §257.73(c)-(e), or §257.82.

- Confirm that the BAP meets all of the requirements associated with §257.73(a)(2)-(3), (c), (d), (e), and §257.82, or, if the BAP does not meet all requirements, provide recommendations for compliance with these sections of the CCR Rule [1].

SECTION 2

COMPARISION OF INITIAL AND PEROIDIC SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at the BAP between the start of the initial CCR certification program in 2015 and 2016 (initial conditions) and subsequent collection of periodic certification site data in 2020 and 2021 (periodic conditions).

2.2 Review of Annual Inspection Reports

Annual onsite inspections for the BAP were performed between 2016 and 2020 ([10], [11], [12], [13]) were certified by a licensed professional engineer in accordance with §257.83(b). Each inspection report stated the following information, relative to the previous inspection:

- A statement that no changes in geometry of the impounding structure were observed since the previous inspection;
- Information on maximum recorded instrumentation readings and water levels;
- Approximate volumes of impounded water and CCR at the time of inspection;
- A statement that no appearances of actual or potential structural weakness or other disruptive conditions were observed; and
- A statement that no other changes which may have affected the stability or operation of the impounding structure were observed.

In summary, the reports did not indicate any significant changes to the BAP between 2015 and 2020. No signs of instability, structural weakness, or changes which may have affected the operation or stability of the BAP were noted in the inspection reports.

2.3 Review of Instrumentation Data

Three piezometers, BAL-P001, BAL-P002, and BAL-P007 are present at the BAP and were monitored monthly by DMG between August 14, 2015 and May 19, 2021 [14]. Geosyntec reviewed the piezometer data to evaluate if significant fluctuations, partially increases in phreatic levels, may have occurred between development of the initial structural stability and factor of safety certifications ([9], [5], [6]) and May 19, 2021. Available piezometer readings are plotted in **Attachment A**.

In summary, only minor changes in phreatic conditions were observed in the available piezometric data. The phreatic level typically varied by less than five feet for these piezometers. These changes do not indicate significantly different phreatic levels than those utilized for the initial structural stability and factor of safety certifications ([9], [5], [6]).

2.4 Comparison of Initial to Periodic Surveys

The initial survey of the BAP, conducted by Weaver Consultants (Weaver) in 2015 [15], was compared to the periodic survey of the BAP, conducted by IngenAE, LLC (IngenAE) in 2020 [16], using AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within the BAP and considered volumetric changes above and below the starting water surface elevation (SWSE) used for the 2016 §257.82 inflow design flood control plan hydraulic analysis [9]. Potential changes to embankment geometry were also evaluated. This comparison is presented in a side-by-side comparison of the surveys in **Drawing 1** and a plan view isopach map denoting changes in ground surface elevation in **Drawing 1**. A summary of the water elevations and changes in CCR volumes is provided in **Table 2**.

Table 2 – Initial to Periodic Survey Comparison

Initial Surveyed Pool Elevation (ft)	415.32
Periodic Surveyed Pool Elevation (ft)	415.23
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	415.80
Total Change in CCR Volume (CY)	+99,648 (fill)
Change in CCR Volume Above Initial SWSE (CY)	+82,731 (fill)
Change in CCR Volume Below Initial SWSE (CY)	+16,916 (fill)

The comparison indicated that approximately 99,600 CY of CCR was placed in the BAP between the initial and periodic surveys, thereby leading to a potential for the peak water surface elevation (PWSE) to increase during the inflow design 1,000-year flood event. Bottom ash was excavated for beneficial use in the closure construction for the FAPS from September 2016 to October 2020, which is indicated in the cut/fill volumes of 258,761/358,409 CY. The minimum crest elevation of the embankment dike appeared to have changed from El. 419 ft to El. 418 ft in the periodic survey, although the embankment crest was subsequently increased to El. 420 ft by the BPP in October of 2021. No other significant changes to embankment geometry appeared to have occurred between the initial and periodic surveys.

2.5 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of the BAP collected by Weaver in 2015 [15] were compared to periodic aerial photographs collected by IngenAE in 2020 [16] to visually evaluate if potential site changes (i.e., changes to the embankment, outlet structures, limits of CCR, other appurtenances) may have occurred. A comparison of these aerial photographs is provided in **Drawing 3**, and the following changes were identified:

- Adjacent CCR surface impoundments within the FAPS, consisting of the Old East Ash Pond, East Ash Pond, and West Fly Ash Pond (OEAP, EAP, and WFAP) were closed.

- CCR was removed from the BAP for beneficial use.

- Non-contact stormwater discharge from post-closure the FAPS is now directed to the southern portion of the BAP through a 60-inch diameter reinforced concrete pipe (RCP).

2.6 Comparison of Initial to Periodic Site Visits

An initial site visit to the BAP was conducted by AECOM in 2015 and documented with a Site Visit Summary and corresponding photographs [17]. A periodic site visit was conducted by Mr. Thomas Ward P.E. of Geosyntec on May 21, 2021 and a follow-up site visit was performed by Mr. Ward on October 12, 2021. The site visit was intended to evaluate potential changes at the site since the initial certifications were prepared (i.e., modification to the embankment, outlet structures or other appurtenances, limits of CCR, maintenance programs, repairs), in addition to performing visual observations of the BAP to evaluate if the structural stability requirements (§257.73(d)) were still met. The stie visit included walking the perimeter of the BAP, visually observing conditions, recording filed notes, and collecting photographs. The site visit is documented in a photographic log provided in **Attachment B**. A summary of significant findings from the periodic site visit is provided below:

- Maintenance and operational conditions appeared similar between 2015 and 2021.

- No signs of structural instability were noted. Visual observations did not indicate insufficient slope vegetation and protection, compaction or instability at the dikes or abutments, sudden drawdown instability, or spillway erosion.

- The FAPS originally discharged to the BAP through a 6-inch pump and pipe system from the WFAP. Modifications to the BAP were observed including altering the inflow from the FAPS to a new 60-inch diameter RCP culvert as part of the FAPS closure construction and construction of a berm along the western hauling road for placement of fly ash and ash from economizer hoppers. Additionally, additional outfalls have been constructed that do not discharge to the BAP.

- DMG raised the crest elevation of the BAP perimeter dike to El. 420 ft in October of 2021. The dike raise included placing up to 2 ft of compacted crushed stone fill to a width of approximately 20 ft. The existing emergency spillway was left in-place (i.e. not modified) during this dike raise. Geosyntec conducted a site visit during the construction on October 12, 2021 and DMG provided photographs of the completed raise on October 13, 2021. DMG confirmed that the raise was completed to El. 420 ft and that the emergency spillway was not modified. Photographs of this raise are also provided in **Attachment B**.

2.7 Interview with Power Plant Staff

An interview with Ms. Kim Edmiaston of the BPP was conducted by Mr. Thomas W. Ward P.E. of Geosyntec on May 21, 2021. Ms. Kim Edmiaston was employed at Baldwin Power Plant between 2015 and 2021. The interview included a discussion of included a discussion of potential changes that that may have occurred at the BAP since development of the initial certifications ([2], [3], [4], [5], [6], [7]). A separate discussion was held on June 14, 2021 for the FAPS as it pertains to the certification of the BAP. A summary of the interview is provided below.

- Were any construction projects completed for the BAP since 2015, and, if so, are design drawings and/or details available?
    - Inflow from the FAPS is now going through a 60-inch diameter culvert and some flow is being directed to the Secondary Pond downstream of the BAP. Drawings are readily available.
    - A berm was constructed in 2021 for the BAP to separate Econ/SCR/Air Heater Ash from production Fly Ash. These materials are now being placed in the Bottom Ash Pond. This design was constructed onsite in 2020 and is located perpendicular to the Eastern perimeter of the Bottom Ash Pond.
- Were there any changes to the purpose of the BAP since 2015?
    - U3 was retired in [October] 2016 and is no longer generating ash. Fly Ash from U1 and U2 is now placed along the southern portion of the Eastern perimeter dike of the BAP by truck. Sluice lines still deposit Econ/SCR/Air Heater ash in the same area and is dipped/stacked along the midpoint of the Eastern perimeter dike of the BAP. No changes to U1 or U2 bottom ash slag area.
- Were there any changes to the to the instrumentation program and/or physical instruments for the BAP since 2015?
    - Yes, piezometers BAL-P003, BAL-P006, and BAL-P013, located between the FAPS and BAP, were abandoned as part of the FAPS closure construction.
- Have area-capacity curves for the BAP been prepared since 2015?
    - No.
- Were there any changes to spillways and/or diversion features for the BAP completed since 2015?

- No.

- Were there any changes to spillways and/or diversion features for the BAP completed since 2015?
    - No.
- Were there any instances of dike and/or structural instability for the BAP since 2015?
    - No.

SECTION 3

HAZARD POTENTIAL CLASSIFICATION - §257.73(a)(2)

3.1 Overview of Initial HPC

The Initial Hazard Potential Classification (Initial HPC) was prepared by Stantec Consulting Services, Inc. (Stantec) in 2016 ([2], [8]), following the requirements of §257.73(a)(2). The Initial HPC included the following information:

- Performing a visual analysis to evaluate potential hazards associated with a breach failure along the west face of the BAP, and the southwest face of the tertiary pond. Locations were based on locations of nearby downstream structures and locations typically occupied by people.

- Evaluation of potential breach flow paths were evaluated using elevation data and aerial imagery to evaluate potential impacts to downstream structures, infrastructure, frequently occupied facilities/areas, and waterways [2].

- While a breach map is not included within the Initial HPC, it is included within the §257.73(a)(3) Initial Emergency Action Plan (Initial EmAP) [3].

The visual analysis indicated that none of the breach scenarios appeared to impact occupied structures, although a breach of the east embankment could impact Conservation Road from overland flow traveling south and west with discharge to the Kaskaskia River. The Initial HPC concluded that neither breach would be likely to result in a probable loss of human life, although the breach could cause CCR to be released into the Kaskaskia River, thereby causing environmental damage. The Initial HPC therefore recommended a "Significant" hazard potential classification for the BAP [2].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC, in terms of technical approach, input parameters, assessment of the results, and applicable requirements of the CCR Rule [1]. No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

Geosyntec performed a review of the Initial HPC ([2], [8]), in terms of technical approach, input parameters, and assessment of the results. The review included the following tasks:

- Review of all report documentation and figures

- Check that correct CCR Rule guidance is referenced and adhered to

- Review of appropriate failure mode selections
- Review for changes to the site and surrounding area
- Review that appropriate breach analysis methodology, model software, and inputs were utilized
- Check that selected HPC is appropriate per results of the breach analysis

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

3.3 Summary of Site Changes Affecting the Initial HPC

Geosyntec did not identify any changes at the site that may affect the HPC. No new structures, infrastructure, frequently occupied facilities/areas, or waterways were present in the probable breach area indicated in the Initial EmAP [3]. Additionally, no significant changes to the topography in the probable breach were identified.

3.4 Periodic HPC

Geosyntec recommends retaining the "Significant" hazard potential classification for the BAP, per §257.73(A)(2), based on the lack of site changes potentially affecting the Initial HPC occurring since the initial HPC was developed, as described in **Section 3.3**, and the lack of significant review comments, as described in **Section 3.2**. Updates to the Initial HPC reports ([2], [8]) are not recommended at this time.

SECTION 4

HISTORY OF CONSTRUCTION REPORT - §257.73(c)

4.1 Overview of Initial HoC

The Initial History of Construction report (Initial HoC) was prepared by AECOM in 2016 [4], following the requirements of §257.73(c), and included information on all CCR surface impoundments at Baldwin Power Plant. The Initial HoC included the following information for each CCR surface impoundment:

- The name and address of the owner/operator,
- Location maps,
- Statements of purpose,
- The names and size of the surrounding watershed,
- A description of the foundation and abutment materials,
- A description of the dike materials,
- Approximate dates and stages of construction,
- Available design and engineering drawings,
- A summary of instrumentation,
- A statement that area-capacity curves are not available,
- Information on spillway structures,
- Construction specifications,
- Inspection and surveillance plans,
- Information on operational and maintenance procedures, and
- A statement that historical structural instability had not occurred at any of the CCR surface impoundments.

4.2 Summary of Site Affecting the Initial HoC

Several changes at the site that occurred after development of the initial HoC report were identified. These changes required updates to the HoC report. Each change and the corresponding updates to the HoC report [4] are described below:

- A state identification number (ID) W1578510001-06 was assigned to the BAP by the Illinois Environmental Protection Agency (IEPA).
- A revised area-capacity curve and spillway design calculations for the BAP were prepared as part of the updated periodic Inflow Design Flood Control System Plan, as described in **Section 7.4**.
- The minimum crest elevation of the BAP perimeter dike was increased to El. 420.0 ft in October 2021.

SECTION 5

STRUCTURAL STABILITY ASSESSMENT - §257.73(d)

5.1 Overview of Initial SSA

The Initial Structural Stability Assessment (Initial SSA) was prepared by AECOM in 2016 ([5], [9]), following the requirements of §257.73(d)(1), and included the following evaluations:

- Stability of dike foundations, dike abutments, slope protection, dike compaction, and slope vegetation; and
- Spillway stability including capacity, structural stability and integrity.

The Initial SSA concluded that the structural stability requirements for §257.73(d)(1)(vii) were not applicable for the BAP, and the BAP met all requirements for§257.73(d)(1)(i)-(vi).

The Initial SSA referenced the results of the Initial Structural Factor Assessment (Initial SFA) ([6], [9]) to demonstrate stability of the stability of foundations and abutments (§257.73(d)(1)(i)) and sufficiency of dike compaction (§257.73(d)(1)(iii)) portions of the SSA criteria. This included stating that slope stability analyses for slip surfaces passing through the foundation met or exceeded the criteria listed in §257.73(e)(1), for the stability of foundations and abutments. For the sufficiency of dike compaction, this included stating that slope stability analyses for slip surfaces passing through the dike also met or exceeded the §257.73(e)(1) criteria.

5.2 Review of Initial SSA

Geosyntec performed a review of the Initial SSA ([5], [9]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing photographs collected in 2015 and used to demonstrate compliance with §257.73(d)(1)(i)-(vii),
- Reviewing geotechnical calculations used to demonstrate the stability of foundations, per §257.73(d)(1)(i) and sufficiency of dike compaction, per §257.73(d)(1)(iii). Supporting geotechnical investigation and testing data, input parameters, analysis methodology, selection of critical cross-sections, and loading conditions,
- Review of the methodology used to demonstrate that a downstream water body that could induce a sudden drawdown condition, per §257.73(d)(1)(vii), is not present, and

- Completeness and technical approach of closed-circuit television (CCTV) inspections used to evaluate the stability of hydraulic structures, per §257.73(d)(1)(vi).

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

5.3 Summary of Site Changes Affecting the Initial SSA

A number of changes at the site that occurred after development of the Initial SSA were identified. These changes required updates to the Initial SSA and are described below:

- The Initial SSA utilized the results of the Initial Inflow Design Flood Control System Plan (IDF) to demonstrate compliance with the adequacy of spillway design and management (§257.73(d)(1)(v)(A)-(B)). The Initial IDF was subsequently updated to develop a Periodic IDF, based on site changes, as discussed in **Section 7**.

- The Initial SSA utilized the slope stability analysis results of the Initial Safety Factor Assessment (SFA) as part of the compliance demonstration for the stability of foundations and abutments (§257.73(d)(1)(i)) and sufficiency of dike compaction (§257.73(d)(1)(iii)) as discussed in **Section 5.1**. The Initial SFA slope stability analyses were subsequently updated to develop a Periodic SFA, based on site changes, as discussed in **Section 6**.

- No known inspections of the spillway culvert have been completed since 2016. Therefore, the condition of the interior of the culvert, as it pertains to §257.73(d)(1)(vi), is currently unknown.

- The minimum crest elevation of the BAP perimeter dike was increased to El. 420.0 ft in October 2021 and after development of the Initial SFA.

5.4 Periodic SSA

The Periodic SFA (**Section 6**) indicates that foundations and abutments are stable and dike compaction is sufficient for expected ranges in loading conditions, as slope stability factors of safety were found to meet or exceed the requirements of §257.73(e)(1), including for static maximums storage pool conditions and maximum surcharge pool (i.e., flood) loading conditions. Therefore, the requirements of §257.73(d)(1)(i) and §257.73(d)(1)(iii) are met for the Periodic SSA.

The Periodic IDF (**Section 7**) indicates that spillways are adequately designed and constructed to adequately manage flow during the 1,000-year flood, as the spillways can adequately manage flow during peak discharge from the 1,000-year flood event without overtopping of the embankments. Therefore, the requirements of §257.73(d)(1)(v)(A)-(B) are met for the Periodic SSA. Certification of §257.73(d)(1)(vi) was not included in the scope of this report.

SECTION 6

SAFETY FACTOR ASSESSMENT - §257.73(e)(1)

6.1 Overview of Initial SFA

The Initial Safety Factor Assessment (Initial SFA) was prepared by AECOM in 2016 ([6], [9]), following the requirements of §257.73(e)(1). The Initial SFA included the following information:

- A geotechnical investigation program with in-situ and laboratory testing;
- An assessment of the potential for liquefaction in the dike and foundation soils;
- The development of two slope stability cross-sections for limit equilibrium stability analysis utilizing GeoStudio SLOPE/W software; and
- The analysis of both cross-sections for maximum storage pool, maximum surcharge pool, seismic loading conditions.
  - Liquefaction loading conditions were not evaluated as liquefaction-susceptible soil layers were not identified in either the embankments or foundation soils.

The Initial SFA concluded that the BAP met all safety factor requirements, per §257.73(e), as all calculated safety factors were equal to or higher than the minimum required values.

6.2 Review of Initial SFA

Geosyntec performed a review of the Initial SFA ([6], [9]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing geotechnical calculations used to demonstrate the acceptable safety factors, per §257.73(e)(1), in terms of:
  - Completeness and adequacy of supporting geotechnical investigation and testing data;
  - Completeness and approach of liquefaction triggering assessments; and
  - Input parameters, analysis methodology, selection of critical cross-sections, and loading conditions utilized for slope stability analyses.
  - Phreatic conditions based on piezometric data collected between August 14, 2021 and May 19, 2021, as discussed in **Section 2.3**.

No significant technical issues were noted within the technical reviewed, although a detailed review (e.g., check) of the calculations was not performed.

6.3 Summary of Site Changes Affecting the Initial SFA

Two changes at the site that occurred after development of the Initial SFA ([6], [9]) were identified. These changes required updates to the Initial SFA and are described below:

- The Periodic IDF (**Section 7)** found that the normal pool elevation within the BAP decreased from El. 415.8 to El. 415.2 ft. This resulted in 0.6 ft decrease of water loading on the embankment dikes than was considered in the Initial SFA for the maximum storage pool and seismic loading conditions (§257.73(e)(1)(i) and (iii)). Peak water surface elevations during the IDF increased from 418.7 to 419.2 ft within the BAP which could have resulted in an additional 0.5 ft of water loading on the embankment dikes than was considered in the Initial SFA for the maximum surcharge pool loading conditions (§257.73(e)(1)(i)).

- Ground surface geometry used in the Initial SFA analyses is based on a crest elevation of 419.0 ft while the minimum crest elevation of the BAP perimeter dike was increased in October 2021 to El. 420.0 ft , after development of the Initial SFA.

6.4 Periodic SFA

Geosyntec revised existing slope stability analyses associated with the Initial SFA ([6], [9]), for the single cross-section previously evaluated to account for site changes, as described in **Section 6.3**. The following approach and input data were used to revise the analyses:

- Ground surface geometry was revised for all the loading conditions, using the 2020 survey to account for the corrected dike crest elevation.

- Water levels in the BAP for the maximum storage pool, and seismic slope stability analysis loading conditions were decreased to El. 415.2, based on the Periodic IDF.

- Water levels in the impoundment for maximum surcharge pool slope stability analysis loading conditions were increased to El. 419.2 ft, as the result of Periodic IDF (**Section 7.4**).

- The October 2021 BAP perimeter dike crest raise was reportedly constructed to El. 420 ft, but the crest in the slope stability model was conservatively assumed to be El. 421 ft to account for potential variations in crest elevation.

- All other analysis input data and settings from the Initial SFA ([6], [9]) were utilized, including, but not limited to, subsurface stratigraphy and soil strengths, phreatic conditions, ground surface geometry, software package and version, slip surface search routines and methods, and input data for the seismic analyses.

Factors of safety from the Periodic SFA are summarized in Table 3 and confirm that the BAP meets the requirements of §257.73(e)(1). Slope stability analysis output associated with the Periodic SFA is provided in **Attachment D**.

Table 3 – Factors of Safety from Periodic SFA

	Structural Stability Assessment (§257.73(d)) and Safety Factor Assessment (§257.73(e))			
Cross-Section	**Maximum Storage Pool §257.73(e)(1)(i) Minimum Required = 1.50**	**Maximum Surcharge Pool[1] §257.73(e)(1)(ii) Minimum Required = 1.40**	**Seismic §257.73(e)(1)(iii) Minimum Required = 1.00**	**Dike Liquefaction §257.73(e)(1)(iv) Minimum Required = 1.20**
(9)	2.00	2.00	1.41	N/A

Notes:
N/A – Loading condition is not applicable.

SECTION 7

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN - §257.82

7.1 Overview of Initial IDF

The Initial Inflow Design Flood Control System Plan (Initial IDF) was prepared by AECOM in 2016 ([7], [9]) following the requirements of §257.82. The Initial IDF included the following information:

- A hydraulic and hydrologic analysis, performed for the 1,000-year design flood event because of the hazard potential classification of "significant", which corresponded to 11.2 inches of rainfall over a 24-hour period.

- The Initial IDF utilized a HydroCAD Version 10 model to evaluate spillway flows and pool level increases during the design flood, with a SWSE of 415.8 ft.

The Initial IDF concluded that the BAP met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was El. 418.7 ft, relative to a minimum BAP dike crest elevation of 419.0 ft. Therefore, overtopping was not expected. The Initial IDF also evaluated the potential for discharge from the CCR unit and determined that discharge in violation of the existing NDPES for the BAP was not expected, as all discharge from the BAP during both normal and inflow design flood conditions was expected to be routed through the existing spillway and NDPES-permitted outfall.

7.2 Review of Initial IDF

Geosyntec performed a review of the Initial IDF ([7], [9]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing the return interval used vs. the hazard potential classification,

- Reviewing the rainfall depth and distribution for appropriateness,

- Performing a high-level review of the inputs to the hydrological modeling,

- Reviewing the hydrologic model parameters for spillway parameters, starting pool elevation, and storage vs. the reference data, and

- Reviewing the overall Initial IDF vs. the applicable requirements of the CCR Rule [1].

Several review comments were identified during review of the Initial IDF. The comments are described below:

- Hydrologic soil group types for some areas require updates based on conditions observed at BEC.
- The BAP emergency spillway invert elevation was reported to be higher than the elevation included within the hydrologic and hydraulic analysis file.
- Documentation of soil conditions (e.g., via NRCS Web Soil Survey) was not provided.

7.3 Summary of Site Changes Affecting the Initial IDF

For the purposes of this discussion the BAP refers to the sub-catchment immediately upstream of the 30-inch riser structure (and subject to the requirements of §257.82). The "BAP Complex" (also called the BAP interior in Section 1.1) refers to the BAP, the upstream interconnected impoundments (e.g., Middle BAP, Ponding Area 1, etc.), and the downstream interconnected impoundments (e.g., Secondary Pond and Tertiary Pond). The BAP Complex interconnected areas are delineated on Figure E-4 which is provided within Attachment E. Four changes at the site that occurred after development of the Initial IDF were identified. These changes required updates to the Initial IDF and are described below:

- Approximately 83,000 CY of CCR were placed above the Initial SWSE utilized for the Initial IDF certification in the BAP Complex, along with additional topographic changes. The placement of the fill has altered the stage-storage curve for the impoundments and the corresponding tributary areas, relative to the Initial IDF.
- The Fly Ash Pond System (FAPS) was closed, thereby altering the contributing drainage area to the BAP Complex relative to the Initial IDF through the routing of post-closure non-contact stormwater from approximately 32 acres of the FAP directly into the BAP. This stormwater was previously retained within the WFAP and was not previously routed into the BAP.
- As discussed in **Section 2.7**, plant power unit U3 was retired in 2016 and is no longer generating fly ash, thereby reducing the process flows to the BAP Complex relative to the Initial IDF.
- The minimum crest elevation of the BAP perimeter dike was raised to El. 420.0 ft in October 2021, after development of the Initial IDF, thereby increasing the minimum crest elevation by 1-foot relative to the Initial IDF.

7.4 Periodic IDF

Electronic HydroCAD model files associated with the Initial IDF were not available; therefore, Geosyntec recreated the HydroCAD model based on the HydroCAD output report provided in the Initial IDF [9]. The recreated model was checked against values reported in the Initial IDF; peak discharge rates at the BAP agreed within 1 cubic feet per second (cfs) and the PWSE at the BAP were the same.

Geosyntec revised the recreated HydroCAD model described above to account for the additional CCR placement and changes in site conditions as described in **Sections 7.2** and **7.3**. The following approach and input data were used for the revised analyses:

- The reach and pond routing methods were updated from "Storage Indication" to "Dynamic Storage Indication" to better represent the interflow of water between the interconnected ponds within the BAP Complex.
- Sub-catchments were re-delineated based on the 2020 site survey [16]. For simplicity, several sub-catchments were consolidated and/or renamed as described below.
    - "Ponding Area 2" and "Channel 3" were consolidated as "Ponding Area 2";
    - "2011 Berm" and "Channel 1" was consolidated and renamed as "Berm Pond – Exterior";
    - "Channel 2" was renamed as "Berm Pond – Interior"; and
    - "To Channel 3" was renamed as "Southeast Corner".
- A portion of the closed FAPS now drains to Ponding Area 2 (within the BAP Complex). A sub-catchment named "Closed FAP to Ponding Area 2" with the following characteristics was added to the model:
    - An area of 31.8 acres of the closed FAPS was estimated to drain to Ponding Area 2 based on the 2020 as-built survey for the FAPS [18].
    - A land cover of >75% grass cover, good condition, Hydrologic Soil Group (HSG) C [curve number (CN) of 74] was selected to represent the closed FAPS vegetated final cover.
    - The time of concentration (ToC) flow path was estimated based on the 2020 FAPS as-built survey [18].
    - A 60-inch reinforced concrete culvert outlet was set with an upstream invert elevation of 442.2 ft, downstream invert elevation of 434.4 ft, length of 95.5 ft, slope of 0.0818 ft/ft, and Manning's n of 0.011 was added based on the 2020 FAPS as-built survey [18].

- A portion of the closed FAPS now drains to the Secondary Pond (downstream of the BAP Complex). A sub-catchment named "Closed FAP to Secondary Pond" with the following characteristics was added to the model:
    - An area of 58.3 acres of the closed FAPS was estimated to drain to the Secondary Pond based on the as-built survey [18].
    - A land cover of >75% grass cover, good condition, Hydrologic Soil Group (HSG) C [curve number (CN) of 74] was selected to represent the closed FAPS vegetated cover.
    - The ToC flow path was estimated based on the 2020 as-built survey [18].
- The BAP was updated as follows:
    - The stage-storage (i.e., area-capacity) curve for the BAP was updated based on the 2020 site survey [16].
        - A revised stage-volume curve for the BAP was prepared based on measuring the storage volume of the BAP at every one-foot increment of depth from the normal pool elevation (414.8 ft) to a perimeter dike embankment crest elevation of 420.0 ft. This analysis identified an overall increase of 1,300 CY (0.8 ac-ft) of storage volume at the BAP from 2016 to 2021 relative to the SWSE used in the Initial IDF. See **Attachment E** for stage-volume (i.e. area-capacity) curve update figures for comparison with the initial IDF curve.
    - The sub-catchment boundary was updated based on the 2020 site survey [16]; this resulted in a decrease in total area from 47.2 acres to 47.0 acres.
    - The ToC flow path was updated to include 100 ft of sheet flow (dense grass, slope of 0.046 ft/ft) and 528 ft of shallow concentrated flow (short grass pasture, slope of 0.024 ft/ft). This update changed the ToC from 26.1 minutes to 18.2 minutes.
    - The BAP perimeter dike minimum crest elevation was updated from El. 419.0 ft to El. 420.0 ft per its documented October 2021 raise.
    - The SWSE within the BAP was updated from 415.8 ft to 415.2 ft to reflect the 2020 site survey [16] and reduction in process flows due to several power units no longer being operated. Automatic baseflow was selected in HydroCAD to set the baseflow to match the discharge rate at the SWSE.
    - The water surface area at the SWSE was updated from 6.2 acres to 7.7 acres to reflect the 2020 site survey [16].
    - The curve numbers for the BAP drainage areas were updated to reflect hydrologic soil group (HSG) D soils. The Initial IDF considered these areas as HSG C; however, the NRCS soil survey describes these areas as predominately "dumps, mine" and "dumps, slurry" with no HSG rating [19]. A HSG rating of D was selected for conservatism.

This resulted in a change of CN from 86 to 89 for the areas above the SWSE assuming <50% grass cover.

  - The emergency spillway elevation was updated from 417.6 ft to 417.7 ft based on 30% Design Drawing C-1035 [20] and the 2020 site survey [16].

  - The length of the emergency spillway (i.e., the dimension perpendicular to the direction of flow) was updated from 50 ft to 36 ft based on the 2020 site survey [16].

  - The breadth of the emergency spillway (i.e., the dimension parallel to the direction of flow) was updated from 50 ft to 52 ft based on the 2020 site survey [16].

  - The 30-inch diameter riser elevation was updated from 414.9 ft to 414.8 ft based on 30% Design Drawing C-1035 [20].

- The Middle BAP (see Figure E-4 in Attachment E for location within BAP Complex) was updated as follows:

  - The stage-storage (i.e., area-capacity) curve for the Middle BAP was updated based on the 2020 site survey [16].

    - A revised stage-volume curve for the Middle BAP was prepared based on measuring the storage volume of the Middle BAP at every one-foot increment of depth from the normal pool elevation (426.0 ft) to an elevation of 430.0 ft. This analysis identified an overall increase of 10,000 CY (6.2 ac-ft) of storage volume at the Middle BAP from 2016 to 2021 relative to the SWSE used in the Initial IDF, in part due to the revised sub-catchment boundary described below.

  - The sub-catchment boundary was updated based on the 2020 site survey [16]; this resulted in an increase in total area from 49.8 acres to 51.8 acres.

  - The ToC flow path was updated to include 100 ft of sheet flow (dense grass, slope of 0.026 ft/ft) and 1,073 ft of shallow concentrated flow (short grass pasture, slope of 0.009 ft/ft). This update changed the ToC from 37.0 minutes to 39.6 minutes.

  - The SWSE within the Middle BAP was updated from 428.3 ft to 426.0 ft to reflect the 2020 site survey [16].

  - The water surface area at the SWSE was updated from 8.2 acres to 7.7 acres to reflect the 2020 site survey [16].

  - The curve numbers for the Middle BAP drainage areas were updated to reflect HSG D soils. The Initial IDF considered these areas as HSG B; however, the NRCS soil survey describes these areas as predominately “Mines, slurries” with no HSG rating. A HSG rating of D was selected for conservatism. This resulted in a change of CN from 79 to 89 for the vegetated areas above the SWSE assuming <50% grass cover.

  - The ToC was updated from 37.0 minutes to be direct entry with a total of 6 minutes in accordance with TR-20 [21].

  - The broad-crested weir elevation was updated from 428.0 ft to 426.0 ft to reflect the 2020 site survey [16]. The breadth and length of the emergency spillway appear to be generally consistent with the dimensions utilized in the Initial IDF.

- Ponding Area 1 (see Figure E-4 in Attachment E for location within BAP Complex) was updated as follows:

  - The stage-storage (i.e., area-capacity) curve for Ponding Area 1 was updated based on the 2020 site survey [16].

    - A revised stage-volume curve for Ponding Area 1 was prepared based on measuring the storage volume of Ponding Area 1 at every one-foot increment of depth from the normal pool elevation (426.0 ft) to an elevation of 430.0 ft. This analysis identified an overall increase of 3,700 CY (2.3 ac-ft) of storage volume at Ponding Area 1 from 2016 to 2021 relative to the SWSE used in the Initial IDF, in part due to the revised sub-catchment boundary described below.

  - The sub-catchment boundary was updated based on the 2020 site survey [16]; this resulted in an increase in total area from 6.1 acres to 7.0 acres.

  - The broad-crested weir elevation was updated from 429.0 ft to 426.0 ft to reflect the 2020 site survey [16].

  - The SWSE within Ponding Area 1 was updated from 429.0 ft to 426.0 ft to reflect the broad-crested weir elevation.

  - The water surface area was updated from 3.0 acres to 1.4 acres to reflect the 2020 site survey [16].

  - The ToC flow path was updated to include 100 ft of sheet flow (short grass surface, slope of 0.04 ft/ft) and 220 ft of shallow concentrated flow (unpaved surface, slope of 0.004 ft/ft). This update changed the ToC from 15.0 minutes to 10.9 minutes.

- Ponding Area 2 (see Figure E-4 in Attachment E for location within BAP Complex) was updated as follows:

  - The stage-storage (i.e., area-capacity) curve for Ponding Area 2 was updated based on the 2020 site survey [16].

    - A revised stage-volume curve for Ponding Area 2 was prepared based on measuring the storage volume of Ponding Area 2 at every one-foot increment of depth from the overtopping elevation (432.0 ft) to an elevation of 435.0 ft. This analysis identified an overall increase of 19,300 CY (12.0 ac-ft) of storage volume at Ponding Area 2 from 2016 to 2021 relative to the SWSE used in the Initial IDF, in part due to the revised sub-catchment boundary described below.

- The sub-catchment boundary was updated based on the 2020 site survey [16]; this resulted in an increase in total area from 12.2 acres to 26.8 acres.

- The ToC flow path was updated to include 100 ft of sheet flow (fallow surface, slope of 0.06 ft/ft), 695 ft of shallow concentrated flow (unpaved surface, slope of 0.004 ft/ft), and 715 ft of shallow concentrated flow (unpaved surface, slope of 0.005 ft/ft). This update changed the ToC from 24.9 minutes to 24.5 minutes.

- Berm Pond – Exterior (see Figure E-4 in Attachment E for location within BAP Complex) was updated as follows:

  - A stage-storage (i.e., area-capacity) curve for Berm Pond – Exterior was prepared based on the 2020 site survey [16].

    - A stage-volume curve for Berm Pond – Exterior was prepared based on measuring the storage volume of Berm Pond – Exterior at every one-foot increment of depth from the invert elevation of the 21-inch culverts (442.0 ft) to the overflow elevation of 444.0 ft. A comparison to the Initial IDF cannot be made due to the changes in site topography within this area from 2016 to 2021.

  - The sub-catchment boundary was updated based on the 2020 site survey [16]; this resulted in an increase in total area from 20.5 acres (for the "To 2011 Berm Pond" sub-catchment) to 21.7 acres.

  - The broad-crested weir elevation representing the emergency spillway was updated from 443.5 ft to 444 ft. to reflect the 2020 site survey [16].

  - The ToC was updated from 9.1 minutes (for "2011 Berm Pond") to be direct entry with a total of 6 minutes in accordance with TR-20 [21].

  - A base flow of 6.5 cfs was added to represent process flows from U1 and U2 based on information provided by BPP plant staff.

- Berm Pond – Interior (see Figure E-4 in Attachment E for location within BAP Complex) was updated as follows:

  - A stage-storage (i.e., area-capacity) curve for Berm Pond – Interior was prepared based on the 2020 site survey [16].

    - A stage-volume curve for Berm Pond – Interior was prepared based on measuring the storage volume at every one-foot increment of depth from the bottom pond elevation (448 ft) to the perimeter berm elevation (452 ft) to reflect the 2020 site survey [16]. A comparison to the Initial IDF cannot be made due to the changes in site topography within this area from 2016 to 2021.

- The sub-catchment boundary was updated based on the 2020 site survey [16]; this resulted in a decrease in total area from 9.0 acres (for the "To Channel 2" sub-catchment) to 7.0 acres.

- The water surface area was updated from 4.2 acres to 2.4 acres to reflect the 2020 site survey [16].

- The ToC was updated from 17.0 minutes (for "To Channel 2") to be direct entry with a total of 6 minutes in accordance with TR-20 [21].

* The Southeast Corner (see Figure E-4 in Attachment E for location within BAP Complex) was updated as follows:

    - The ToC flow path was updated to include 100 ft of sheet flow (fallow surface, slope of 0.034 ft/ft), 173 ft of shallow concentrated flow (unpaved surface, slope of 0.003 ft/ft), 226 ft of shallow concentrated flow (unpaved surface, slope of 0.04 ft/ft), 62 ft of shallow concentrated flow (unpaved surface, slope of 0.08 ft/ft), and 287 ft of shallow concentrated flow (unpaved surface, slope of 0.001 ft/ft). This update changed the ToC from 21.1 minutes to 15.1 minutes.

* Upstream of Secondary Pond was updated as follows:

    - The ToC flow path was updated to include 55 ft of sheet flow (woods: light underbrush, slope of 0.03 ft/ft), and 1,183 ft of shallow concentrated flow (woodland, slope of 0.005 ft/ft). This update changed the ToC from 80.7 minutes to 67.0 minutes.

* The Secondary Pond was updated as follows:

    - The water surface area was updated from 11.3 acres to 9.1 acres to reflect the 2020 site survey [16].

    - The curve number for the Secondary Pond drainage areas were updated to reflect HSG C soils. The Initial IDF considered these areas as HSG B; however, the NRCS soil survey describes these areas as HSG C. This resulted in a change of CN from 65 to 76 for the vegetated areas above the SWSE assuming woods/grass combination and fair condition.

* The Tertiary Pond was updated as follows:

    - The water surface area was updated from 2.4 acres to 2.3 acres to reflect the 2020 site survey [16].

    - The curve number for the Tertiary Pond drainage areas were updated to reflect HSG C soils. The Initial IDF considered these areas as HSG B; however, the NRCS soil survey describes these areas as HSG C. This resulted in a change of CN from 79 (for <50% grass cover) to 74 for the vegetated areas above the SWSE assuming >75% grass cover.

- All other input data and settings from the Initial IDF HydroCAD model were utilized, including, but not limited to software package and version, runoff method, pump information (e.g., pump curve, discharge diameter and length, on and off elevations), analysis time span and analysis time step. Additionally, an Antecedent Moisture Condition (AMC) II was selected under rainfall settings in the HydroCAD model.

The results of the Updated IDF are summarized in **Table 4** indicate that the BAP meets the requirements of §257.82(a), as the peak water surface elevation does not exceed the minimum perimeter dike crest elevation. The PWSE presented below assumes that the pumps in the BAP pump station are turned off during the IDF. If the pumps are turned on during the IDF, the PWSE will be less than the elevation presented in **Table 4**.

The results of the Updated IDF Update indicate that the BAP meets the requirements of §257.82(b). Discharge from the BAP Complex is expected to be routed through the existing spillway structures of the Secondary and Tertiary Ponds prior to discharge through the NDPES-permitted outfall during both normal and inflow design flood conditions. Updated area-capacity curves and HydroCAD model output is provided in **Attachment E**.

Table 4 – Water Levels from Updated Periodic IDF

	Bottom Ash Pond		
Analysis	**Starting Water Surface Elevation (ft)**	**Peak Water Surface Elevation (ft)**	**Minimum Dike Crest Elevation (ft)**
Initial IDF	415.8	418.7	419.0
Updated Periodic IDF	415.2	419.2	420.0
Initial to Periodic Change[1]	-0.5	+0.5	+1.0

Notes:
[1]Positive change indicates an increase relative to the Initial IDF; negative change indicates a decrease relative to the Initial IDF.

SECTION 8

CONCLUSIONS

The BAP at Baldwin Power Plant was evaluated relative to the USEPA CCR Rule periodic assessment requirements for:

- Hazard potential classification (§257.73(a)(2)),
- History of Construction reporting (§257.73(d)),
- Structural stability assessment (§257.73(d)), with the exception of §257.73(d)(1)(vi) that was not included in the scope of this report,
- Safety factor assessment (§257.73(e)), and
- Inflow design flood control system planning (§257.82).

Based on the evaluations presented herein, the referenced requirements are satisfied.

SECTION 9

CERTIFICATION STATEMENT

CCR Unit: Dynegy Midwest Generation, LLC, Baldwin Power Plant, Bottom Ash Pond

I, Thomas W. Ward, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this 2021 USEPA CCR Rule Periodic Certification Report, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the periodic assessment of the hazard potential classification, history of construction report, structural stability, safety factors, and inflow design flood control system planning, dated October 2021, were conducted in accordance with the requirements of 40 CFR §257.73(a)(2), (c), (d), (e), and §257.82, with the exception of §257.73(d)(1)(vi) that was not included in the scope of this certification.

Thomas W. Ward

10/13/21

Date

LICENSED PROFESSIONAL ENGINEER
THOMAS WILLIAM WARD
062-069043
STATE OF ILLINOIS

Exp. 11/30/2021

SECTION 10

REFERENCES

[1] United States Environmental Protection Agency, 40 CFR Parts 257 and 261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, 2015.

[2] Stantec Consulting Services, Inc., "Initial Hazard Potential Classification Assessment, EPA Final CCR Rule, Bottom Ash Pond, Baldwin Power Plant, Randolph County, Illinois," Fenton, MO, October 12, 2016.

[3] Stantec Consulting Services, Inc, "Dynegy Midwestern Generation, LLC, Baldwin Power Plant, City of Baldwin, Randolph County, IL, Emergency Action Plan, Bottom Ash Pond (NID # IL50720)," Fenton, MO, April 13, 2017.

[4] AECOM, "History of Construction, USEPA Final CCR Rule, Baldwin Power Plant, Baldwin, Illinois," October 2016.

[5] AECOM, "CCR Rule Report: Initial Structural Stability Assessment For Bottom Ash Pond At Baldwin Power Plant," St. Louis, MO, October 2016.

[6] AECOM, "CCR Rule Report: Initial Safety Factor Assessment For Bottom Ash Pond At Baldwin Power Plant," St. Louis, MO, October 2016.

[7] AECOM, "CCR Rule Report: Initial Inflow Design Flood Control System Plan For Bottom Ash Pond At Baldwin Power Plant," St. Louis, MO, October 2016.

[8] Stantec Consulting Services, Inc., "Documentation of Initial Hazard Potential Classification Assessment, Bottom Ash Pond, Baldwin Power Plant, Baldwin, Illinois," October 12, 2016.

[9] AECOM, "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for Bottom Ash Pond at Baldwin Power Plant," St. Louis, MO, October 2016.

[10] J. Knutelski and J. Campbell, "Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)),Baldwin Power Plant, Bottom Ash Pond," August 19, 2016.

[11] J. Knutelski and C. Jason, "Annual CCR Suface Impoundment Inpsection Report (per 40 CFR 257.83 (b)(2)); Baldwin Power Plant," 2017.

[12] S. Arends, "Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Baldwin Power Plant, Bottom Ash Pond," September 5, 2018.

[13] J. Knutelski, "Annual Inspection by a Qualified Professional Engineer, 40 CFR 257.83(b), Baldwin Power Plant, Bottom Ash Pond," October 23, 2019.

[14] Geosytnec Consultants, "Spreadsheet: 20210519_baldwin_pz_measurements-BAP," Chesterfield, MO, 2021.

[15] Weaver Consultants Group, "Dynegy, Collinsville, IL, 2015 - Baldwin Topography," Collinsville, IL, December 2015.

[16] IngenAE, "Luminant, Dynegy Midwest Generation, LLC, Baldwin Power Plant, December 2020 Topography," Earth City, Missouri, March 12, 2021.

[17] AECOM, "Initial Plant Site Visit Summary, Dynegy CCR Compliance Program," June 03, 2015.

[18] IngenAE, "Baldwin Power Plant Final Closure Plan Fly Ash Pond System As-Builts," Earth City, MO, October 2020.

[19] Natural Resources Conservation Service, "Web Soil Survey," United States Department of Agriculture, [Online]. Available: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. [Accessed 09 September 2021].

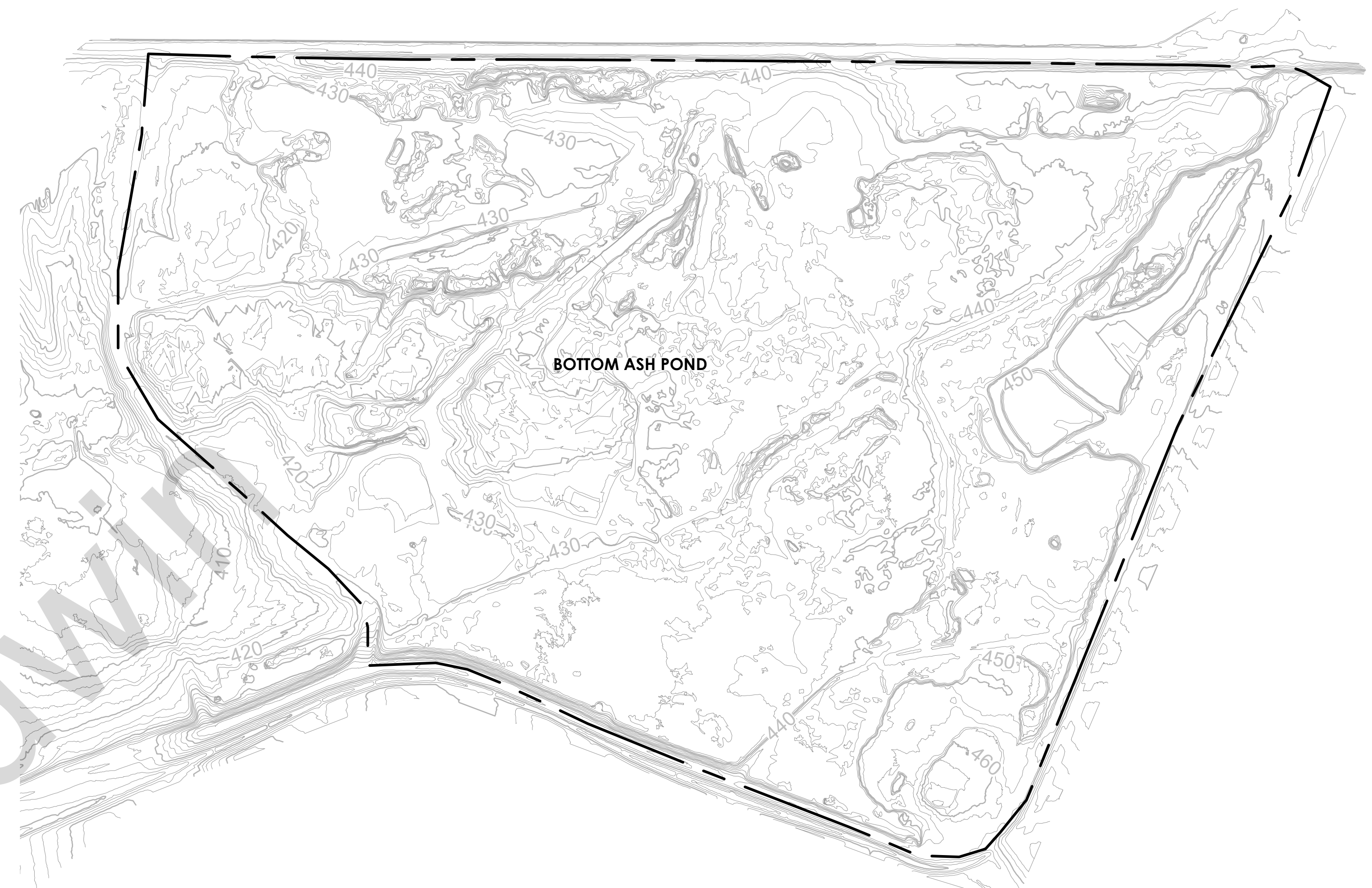
[20] Sargent and Lundy, LLC, *Bottom Ash Pond Dike Improvements Grading and Drainage Plan, Baldwin Energy Complex Unit 2, Dynegy Midwest Generation*, October 4, 2012.

[21] USDA Natural Resources Conservation Service, "WinTR-20 Project Formulation Hydrology, Version 3.20".

DRAWINGS

N

INITIAL SURVEY
11-11-2015 TOPOGRAPHY



PERIODIC SURVEY
03-12-2021 TOPOGRAPHY

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - BALDWIN TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED NOVEMBER 11, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, DYNEGY MIDWEST GENERATION, LLC, BALDWIN ENERGY COMPLEX, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED MARCH 12, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.

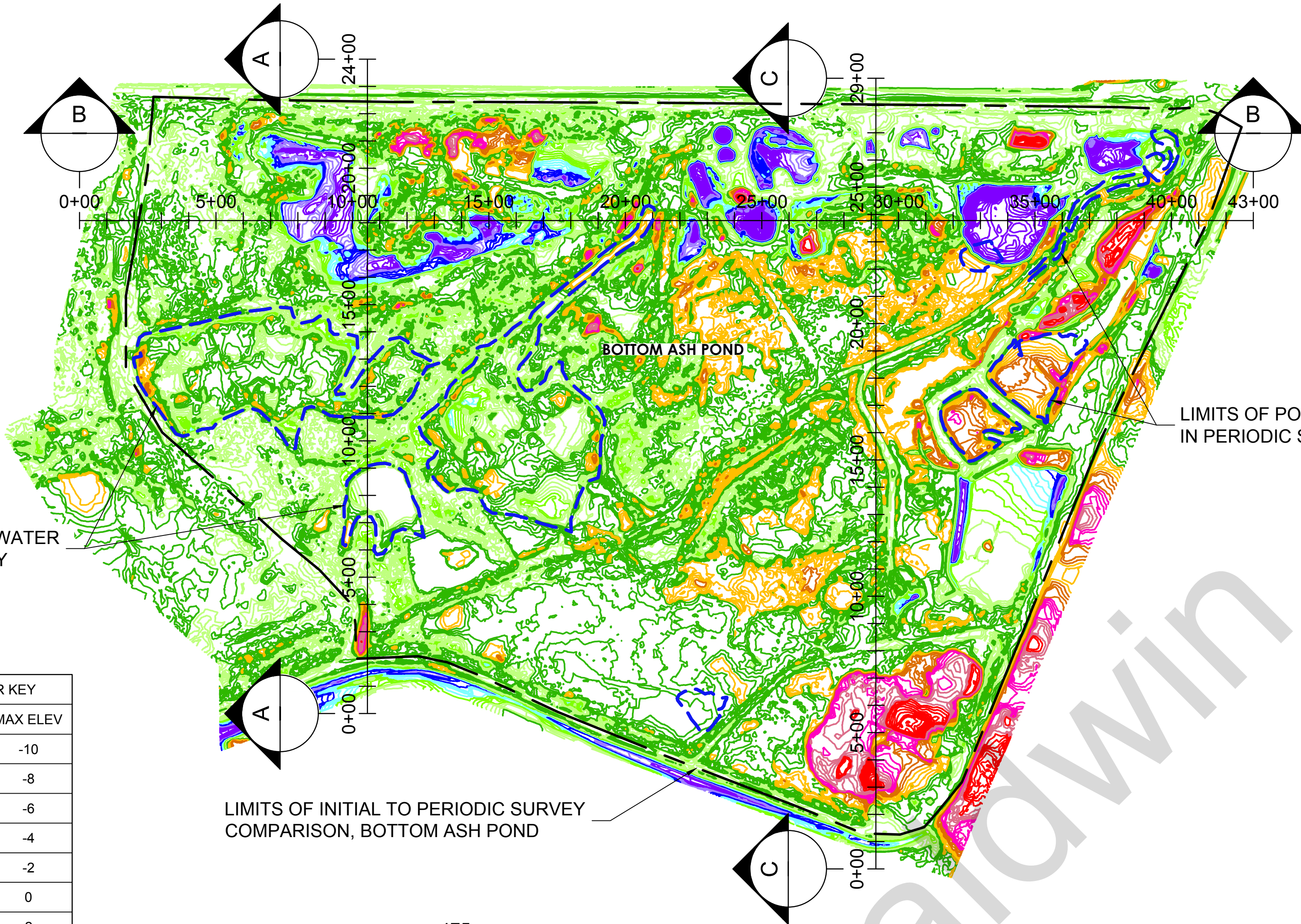
0 600
SCALE IN FEET

INITIAL TO PERIODIC SURVEY COMPARISON
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

Geosyntec consultants

DRAWING 1

GLP8027.01 | MAY 2021

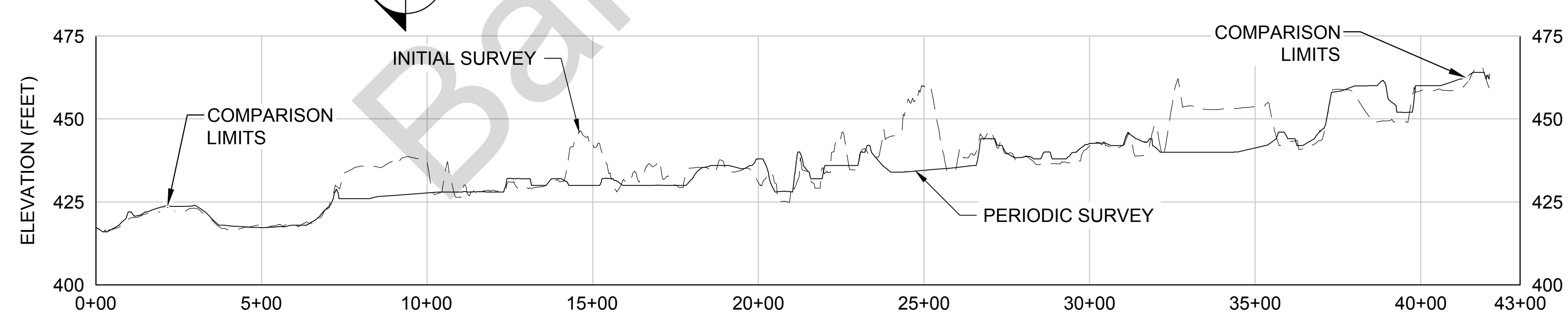


ISOPACH CONTOUR KEY		
COLOR	MIN ELEV	MAX ELEV
Purple	-34.5	-10
Light purple	-10	-8
Blue	-8	-6
Cyan	-6	-4
Bright green	-4	-2
Light green	-2	0
Green	0	2
Yellow-orange	2	4
Orange	4	6
Magenta	6	8
Pink	8	10
Red	10	19

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - BALDWIN TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED NOVEMBER 11, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, DYNEGY MIDWEST GENERATION, LLC, BALDWIN ENERGY COMPLEX, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED MARCH 12, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.
4. THE STARTING WATER SURFACE ELEVATION (SWSE) OF THE BOTTOM ASH POND IS EL. 415.8 FT, AS NOTED IN THE REPORT TITLED “CCR CERTIFICATION REPORT: INITIAL STRUCTURAL STABILITY ASSESSMENT, INITIAL SAFETY FACTOR ASSESSMENT, AND INITIAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN FOR BOTTOM ASH POND AT BALDWIN ENERGY COMPLEX”, PREPARED BY AECOM, DATED OCTOBER, 2016.

INITIAL TO PERIODIC SURVEY COMPARISON SUMMARY			
SURFACE IMPOUNDMENT	CUT	FILL	NET (CU. YD.)
BOTTOM ASH POND	258,761	358,409	99,648 (FILL)
ABOVE SWSE	246,902	329,634	82,731 (FILL)
BELOW SWSE	11,859	28,775	16,916 (FILL)



SECTION B

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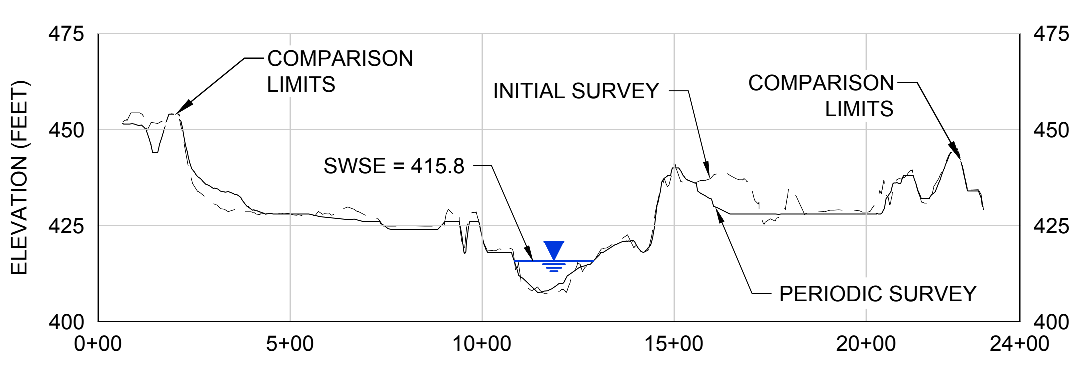
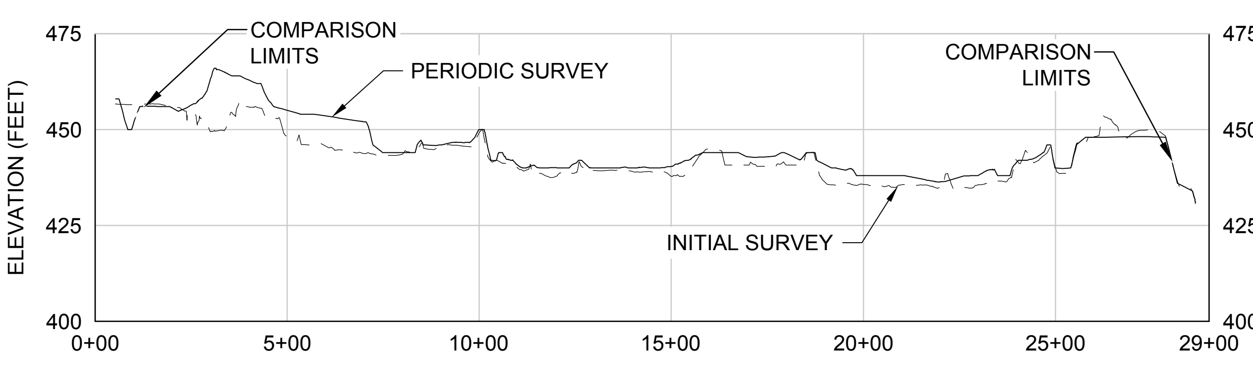
0 50
VERT: SCALE IN FEET



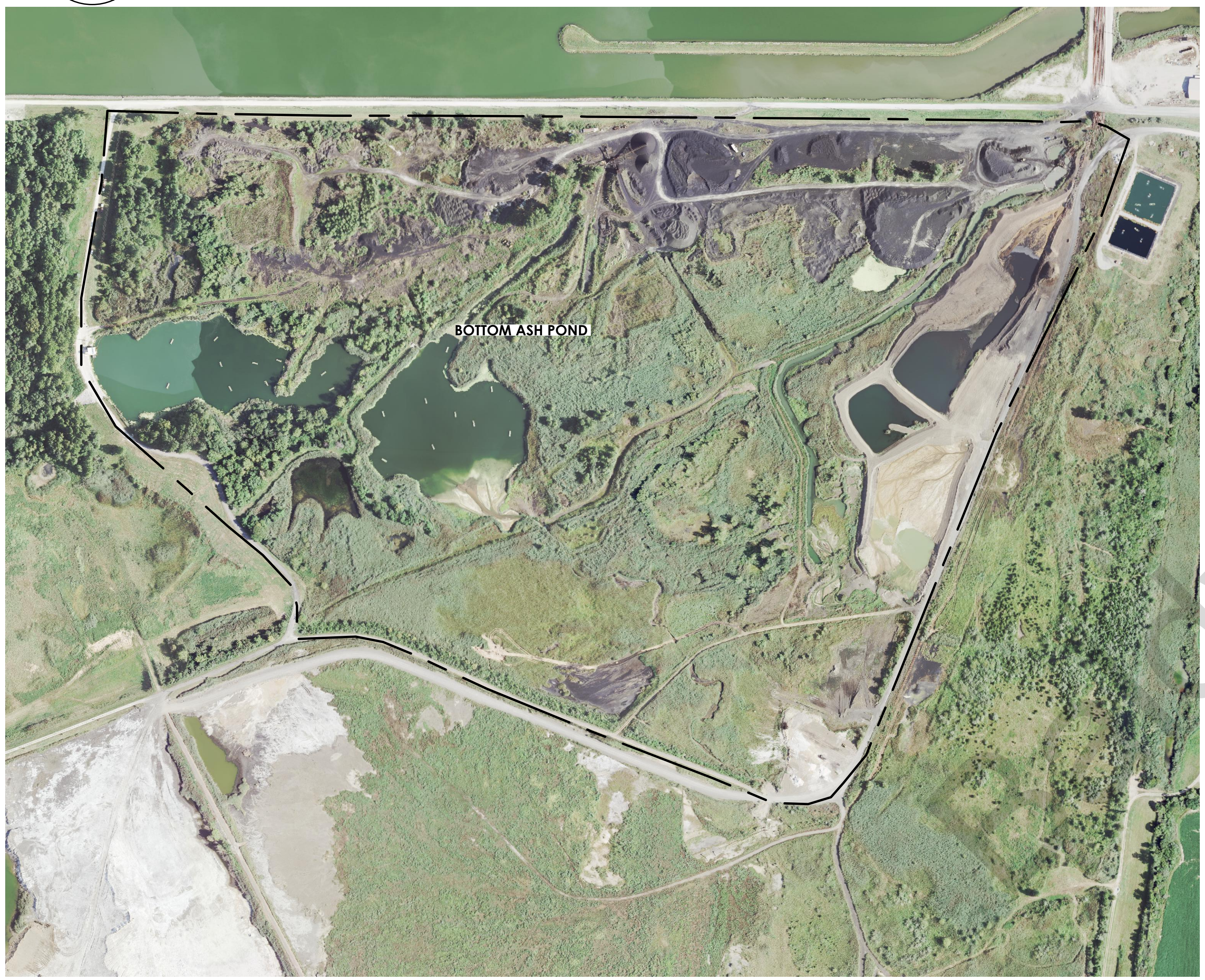
SECTION A



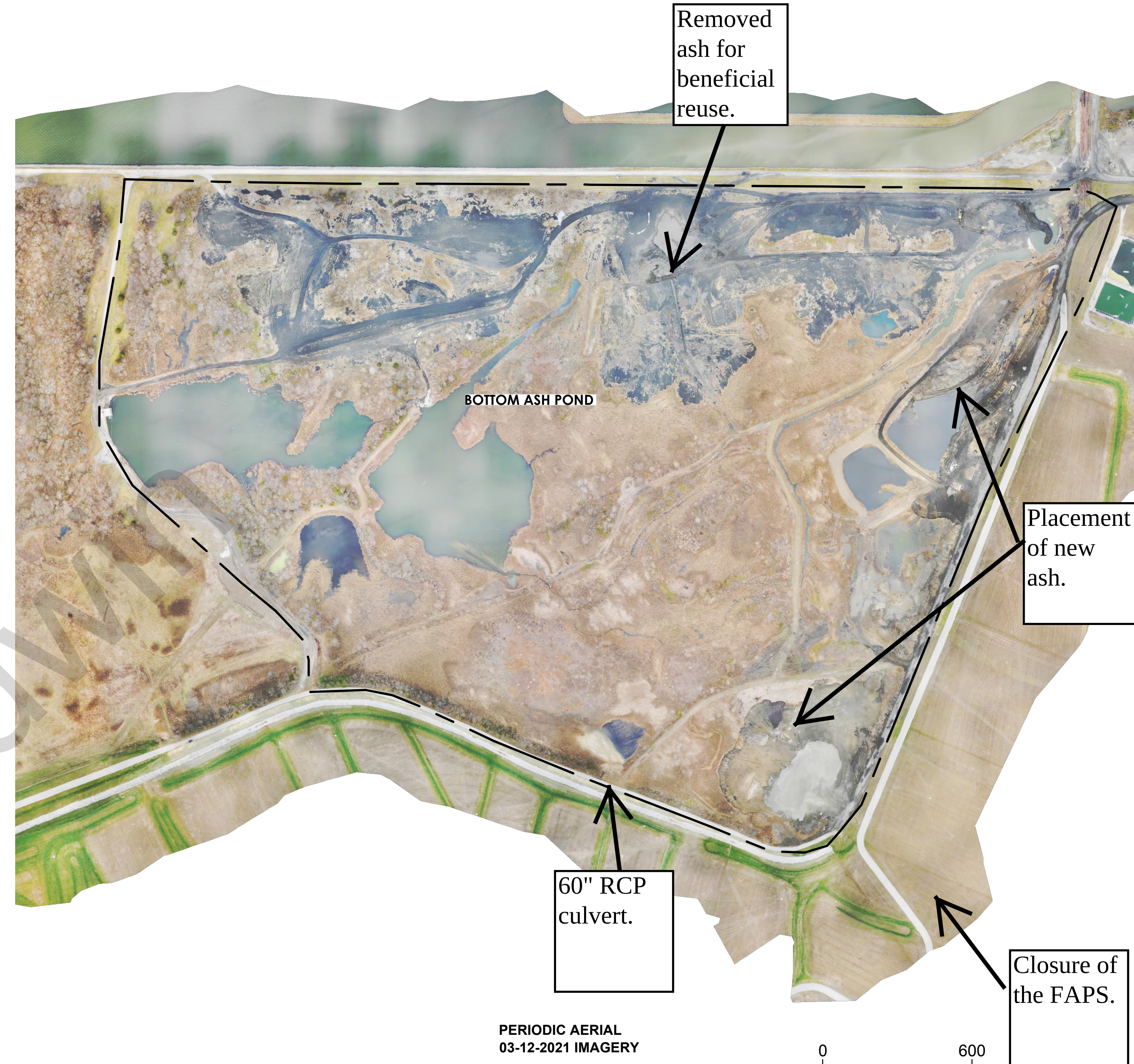
SECTION C

SURVEY COMPARISON ISOPACH BOTTOM ASH POND BALDWIN ENERGY COMPLEX BALDWIN, ILLINOIS	
Geosyntec consultants	DRAWING 2
GLP8027.01 / MAY 2021	

N



INITIAL AERIAL
11-11-2015 IMAGERY



PERIODIC AERIAL
03-12-2021 IMAGERY

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SCALE IN FEET

NOTES:

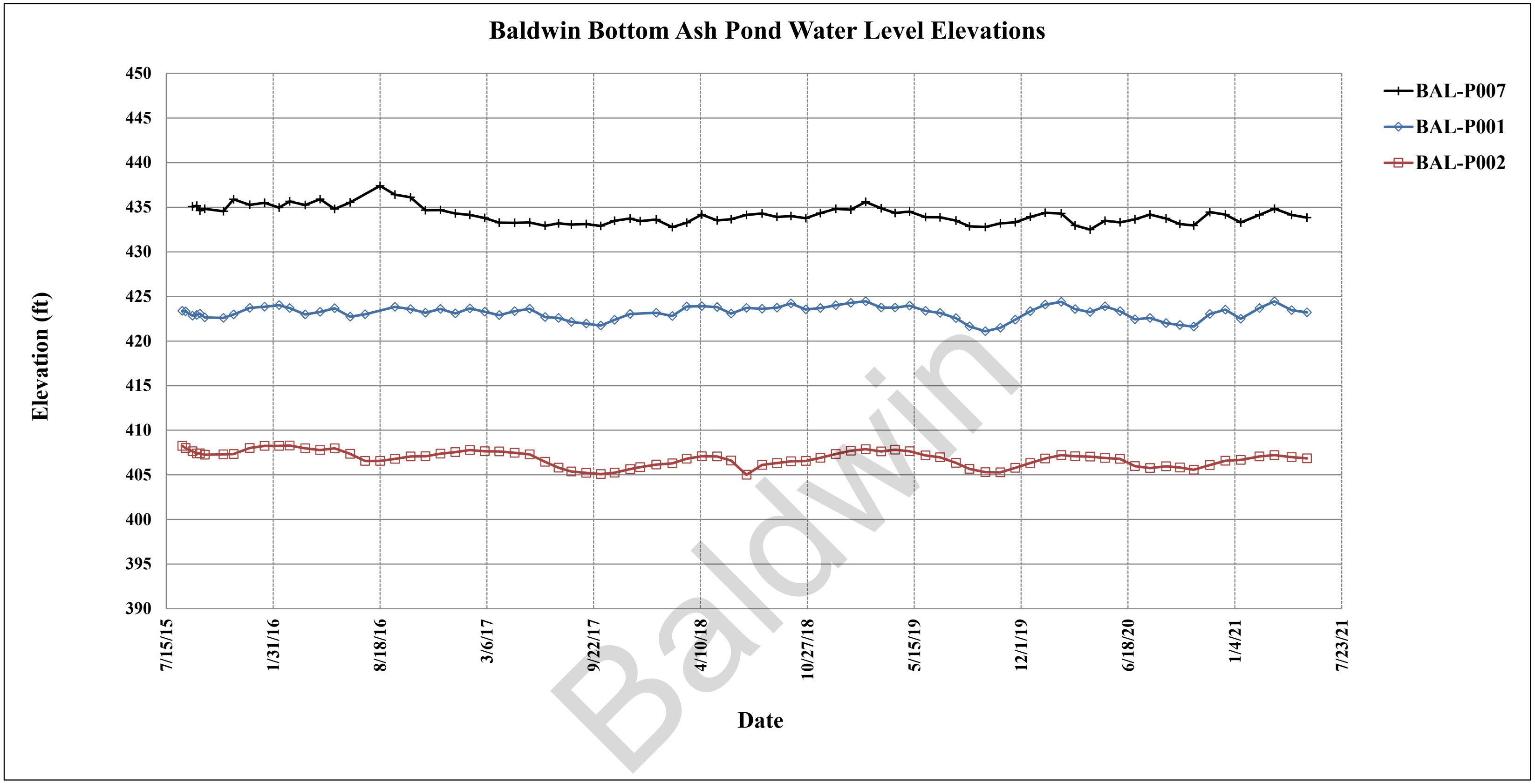
1. THE INITIAL IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - BALDWIN TOPOGRAPHY", PREPARED BY WEAVER CONSULTANTS GROUP, DATED NOVEMBER 11, 2015.
2. THE PERIODIC IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "LUMINANT, DYNEGY MIDWEST GENERATION, LLC, BALDWIN ENERGY COMPLEX, DECEMBER 2020 TOPOGRAPHY", PREPARED BY INGENAE, DATED MARCH 12, 2021.

INITIAL TO PERIODIC AERIAL IMAGERY COMPARISON BOTTOM ASH POND BALDWIN ENERGY COMPLEX BALDWIN, ILLINOIS	
Geosyntec consultants	DRAWING 3
GLP8027.01 / MAY 2021	

ATTACHMENTS

Attachment A

BAP Piezometer Data Plots



NOTES:
1. Piezometer data was taken from the spreadsheet titled "20210519_baldwin_pz_measurements - BAP (3)", provided by the Baldwin Power Plant

PIEZOMETER DATA PERIODIC CERTIFICATION BALDWIN POWER PLANT BALDWIN, ILLINOIS	
Geosyntec consultants	Figure A-1
GLP8027.01	9/17/2021

Attachment B

BAP Site Visit Photolog

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 01 **Date:** 5/21/2021 **Direction Facing:** Northeast **Comments:** View of Bottom Ash Pond.	
Photo: 02 **Date:** 5/21/2021 **Direction Facing:** Northwest **Comments:** View of the Emergency Spillway (outlined).	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 03 **Date:** 5/21/2021 **Direction Facing:** East **Comments:** View of the Bottom Ash Pond and turbidity curtains.	
Photo: 04 **Date:** 5/21/2021 **Direction Facing:** Southwest **Comments:** Rip rap section of the emergency spillway. Arrow shows direction of flow.	

Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 05 **Date:** 5/21/2021 **Direction Facing:** Southeast **Comments:** View of the dam crest. Downstream side of the pond is to right of the crest.	
Photo: 06 **Date:** 5/21/2021 **Direction Facing:** Northwest **Comments:** View of the Bottom Ash Pond dam crest and north abutment. Downstream side of the pond is to the left of the crest.	

Site Owner: Dynegy Midwest Generation, LLC **Project Number:** GLP8027

CCR Unit: Bottom Ash Pond **Site:** Baldwin Power Plant

Photo: 07

Date: 5/21/2021

Direction Facing: Southeast

Comments: View of riprap protection along the upstream slope of the Bottom Ash Pond dam.

Photo: 08

Date: 5/21/2021

Direction Facing: Southeast

Comments: Toe of the Bottom Ash Pond dam.

GEOSYNTEC CONSULTANTS **Photographic Record**	
Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 09

Date: 5/21/2021

Direction Facing: Southeast

Comments: View of the toe of the Bottom Ash Pond with the emergency spillway in the immediate foreground.

Photo: 10

Date: 5/21/2021

Direction Facing: Northwest

Comments: View of the toe of the dam with the riprap lined emergency spillway in view.

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 11

Date: 5/21/2021

Direction Facing: Southwest

Comments: Ponded water found at toe of emergency spillway due to a low spot in elevation.

Photo: 12

Date: 5/21/2021

Direction Facing: N/A

Comments: Area within the Bottom Ash Pond with lack of vegetation. Area is minimal.

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Dynegy Midwest Generation, LLC **Project Number:** GLP8027

CCR Unit: Bottom Ash Pond **Site:** Baldwin Power Plant

Photo: 13

Date: 5/21/2021

Direction Facing: Northwest

Comments: Rut along the toe of the Bottom Ash Pond due to mowing activity. Rutting is not substantial.

Photo: 14

Date: 5/21/2021

Direction Facing: North

Comments: View of the Pump house.

Site Owner: Dynegy Midwest Generation, LLC | **Project Number:** GLP8027

CCR Unit: Bottom Ash Pond | **Site:** Baldwin Power Plant

Photo: 15

Date: 5/21/2021

Direction Facing: East

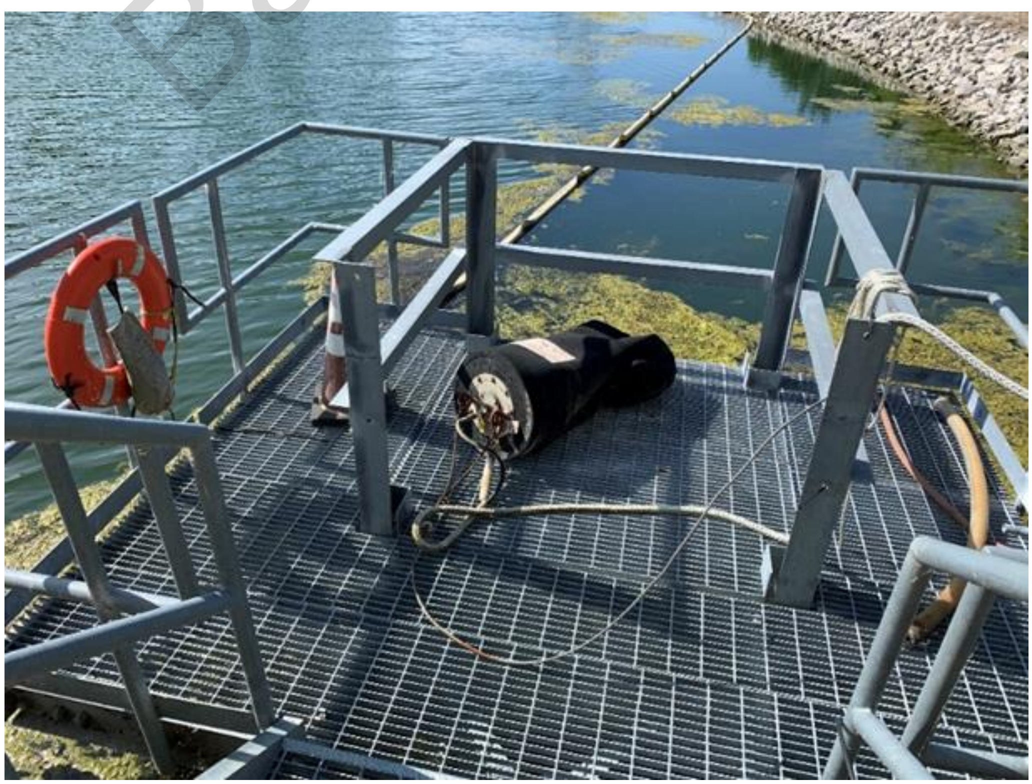
Comments: View of the Pump system.

Photo: 16

Date: 5/21/2021

Direction Facing: South

Comments: View of grated platform above the discharge intake.



Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 17 **Date:** 5/21/2021 **Direction Facing:** N/A **Comments:** View of the primary spillway intake.	
Photo: 18 **Date:** 5/21/2021 **Direction Facing:** Southwest **Comments:** Pipe used to carry ash to the Secondary Pond.	

Site Owner: Dynegy Midwest Generation, LLC | **Project Number:** GLP8027

CCR Unit: Bottom Ash Pond | **Site:** Baldwin Power Plant

Photo: 19

Date: 5/21/2021

Direction Facing: North

Comments: View of the Bottom Ash Pond where the closed Fly Ash Pond System discharges.

Photo: 20

Date: 5/21/2021

Direction Facing: Southwest

Comments: New deposits of CCR being placed.

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Dynegy Midwest Generation, LLC **Project Number:** GLP8027

CCR Unit: Bottom Ash Pond **Site:** Baldwin Power Plant

Photo: 21

Date: 10/12/2021

Direction Facing: South

Comments: View of the perimeter dike raise construction.

Photo: 22

Date: 10/12/2021

Direction Facing: Southwest

Comments: View of the perimeter dike raise construction.

GEOSYNTEC CONSULTANTS **Photographic Record**	
Site Owner: Dynegy Midwest Generation, LLC	**Project Number:** GLP8027
CCR Unit: Bottom Ash Pond	**Site:** Baldwin Power Plant

Photo: 23 **Date:** 10/13/2021 **Direction Facing:** South **Comments:** Completed perimeter dike raise.	
Photo: 24 **Date:** 10/13/2021 **Direction Facing:** North **Comments:** Completed perimeter dike raise.	

Attachment C

Periodic History of Construction Report Update Letter

Geosyntec consultants

1 McBride and Son Center Drive, Suite 202
Chesterfield, MO 63005
PH 636-812-0800
www.geosyntec.com

October 13, 2021

Dynegy Midwest Generation, LLC
10901 Baldwin Rd
Baldwin, Illinois 62217

Subject: Periodic History of Construction Report Update Letter
USEPA Final CCR Rule, 40 CFR §257.73(c)
Baldwin Power Plant
Baldwin, Illinois

At the request of Dynegy Midwest Generation, LLC (DMG), Geosyntec Consultants (Geosyntec) has prepared this Letter to documents updates to the Initial History of Construction (HoC) report for the Baldwin Power Plant (BPP), also known as the Baldwin Energy Complex (BEC). The Initial HoC report was prepared by AECOM in October of 2016 [1] in accordance with 40 Code of Federal Regulations (CFR) §257.73(c) of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals Rule, known as the CCR Rule [2]. This letter also includes information required by Section 845.220(a)(1)(B) (Design and Construction Plans) of the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 CCR Rule [3] that is not expressly required by §257.73(c).

BACKGROUND

The CCR Rule required that, by October 17, 2016, Initial HoC reports to be compiled for existing CCR surface impoundments with: (1) a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) a height of 20 feet or more. The Initial HoC report was required to contain, to the extent feasible, the information specified in 40 CFR §257.73(c)(1)(i)-(xii). The Initial HoC report for BPP, which included the existing CCR surface impoundment, the Bottom Ash Pond (BAP), was prepared and subsequently posted to DMG's CCR Website prior to October 17, 2016.

The CCR Rule requires that Initial HoC to be updated if there is a significant change to any information complied in the Initial HoC report, as listed below:

§ 257.73(c)(2): If there is a significant change to any information complied under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(9).

DMG retained Geosyntec to review the Initial HoC report, review reasonably and readily available information for the BAP generated since the Initial HoC report was prepared, and perform a site visit to BPP to evaluate if significant changes may have occurred since the Initial HoC report was prepared. This Letter contains the results of Geosyntec's evaluation and documents significant changes that have occurred at the BAP and BPP, as they pertain the requirements of §257.73(c)(1)(i)-(xii)

UPDATES TO HISTORY OF CONSTRUCTION REPORT

Geosyntec's evaluation for the BPP BAP determined that no known significant changes requiring updates to the information in the Initial HoC report pertaining to §257.73(c)(1)(ii),(iv)-(v), (vii) and §257.73(c)(1)(xi)-(xii) of the CCR Rule had occurred since the Initial HoC report was developed.

However, Geosyntec's evaluation determined that significant changes at the BPP BAP pertaining to §257.73(c)(1)(i), (iii), (vi), (viii)-(x) of the CCR Rule had occurred since the Initial HoC report had been developed. Additionally, information how long the CCR surface impoundments have been operating and the types of CCR in the surface impoundments, as required by Section 845.220(a)(1)(B) of the Part 845 Rule were not included in the Initial HoC report, as this information is not required by the CCR Rule. Each change and the subsequent updates to the Initial HoC report is described within this section.

Section 845.220(a)(1)(B): A statement of … how long the CCR surface impoundment has been in operation, and the types of CCR that have been placed in the surface impoundment.

Bottom Ash Pond

The BAP operational starting date is readily and reasonable unavailable [1]. The BAP is being used to store and dispose of sluiced bottom ash and to store and dispose of fly ash.

Old East Fly Ash Pond, East Fly Ash Pond and West Fly Ash Pond

The Old East Ash Pond (OEAP), East Ash Pond (EAP), and West Fly Ash Pond (WFAP) were in operation from 1969 to 2020, for a total of approximately 51 years [1]. The OEAP, EAP, and WFAP were used to store and dispose of fly ash [1].

§ 257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

State identification numbers (IDs) for the OEAP, EAP, WFAP, and BAP have been assigned by the Illinois Environmental Protection Agency (IEPA). Each ID is listed in **Table 1**.

Table 1 – IEPA ID Numbers

CCR Surface Impoundment	State ID
Old East Fly Ash Pond (OEAP)	W1578510001-01
East Fly Ash Pond (EAP)	W1578510001-02
West Fly Ash Pond (WFAP)	W1578510001-03
Bottom Ash Pond (BAP)	W1578510001-06

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

The OEAP, EAP, and WFAP were closed in 2020, in substantial compliance with the written closure plans posted to DMG's CCR Website ([4], [5], [6]), and as documented by certified Notification of Completion of Closures posted to DMG's CCR Website ([7], [8]). Therefore, the OEAP, EAP, and WFAP are no longer capable of storing additional CCR or free liquids.

§ 257.73(c)(1)(vi): A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

The table summarizing successive stage of construction in the initial HoC is updated to also reflect the dike raise construction for BAP in October 2021:

Table 2 –Updated table for successive stage of constructions at BPP

Year	Event
1969	Construction of Old East Fly Ash Pond, East Fly Ash Pond, and West Fly Ash Pond external perimeter embankment.
1979	Construction of East Fly Ash Pond and West Fly Ash Pond northern embankment

Year	Event
1989	Inboard perimeters raise of the entire East Fly Ash Pond and West Fly Ash Pond
1995	Construction of interior dike between the East Fly Ash Pond and West Fly Ash Pond
1999	Raise of interior dike between the East Fly Ash Pond and West Fly Ash Pond; replacement of outlet pipe from the West Fly Ash Pond to the Secondary Pond
2012	Modification of Bottom Ash Pond embankment (original construction date unknown)
2021	Dike raise in Bottom Ash Pond in October 2021 to a crest elevation of 420 ft (up to 2 ft of material placement).

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Instrumentation monitoring at the OEAP, EAP, and WFAP is no longer required as these CCR surface impoundments were closed in accordance with §257.102 ([7], [8]), and the instrumentation network was modified at that time. Therefore, the instrumentation locations shown in Appendix C of the Initial HoC report are no longer applicable to the OEAP, EAP, and WFAP. Only piezometers BAL-P001, BAL-P002, and BAL-P007 remain active.

§ 257.73(c)(1)(ix): Area-capacity curves for the CCR unit.

An updated area-capacity curve was prepared for the BAP in 2021. This curve is provided in **Figure 1**.

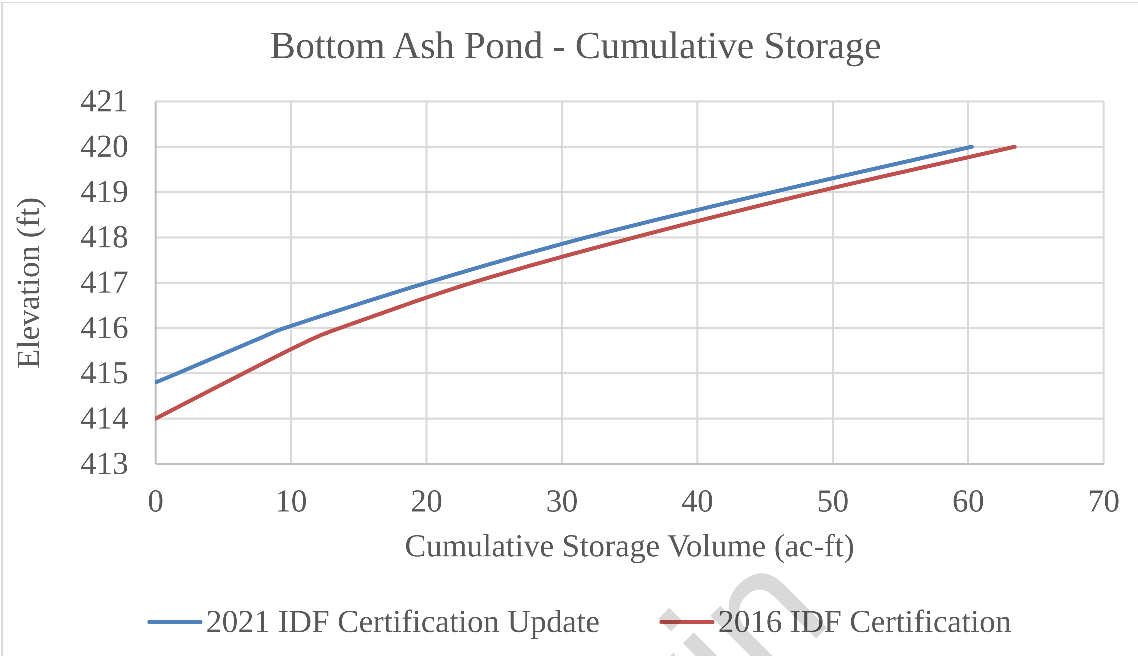


Figure 1 – Area-Capacity Curve for Bottom Ash Pond

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

Updated discharge capacity calculations for the existing spillways were prepared in 2021 using HydroCAD 10 modeling software. The calculations indicate that the BAP spillways have sufficient storage capacity and overtopping is not expected during the 1,000-year, 24-hour storm event. The results of these calculations are provided in **Table 3**.

Table 3 – Results of Updated Discharge Capacity Calculations

	Bottom Ash Pond
Approximate Berm Minimum Elevation[1,2], ft	420.0
Approximate Emergency Spillway Elevation[1], ft	417.7
Starting Water Surface Elevation[1] (SWSE), ft	415.2
IDF Peak Water Surface Elevation[1] (PWSE), ft	419.2
Time to Peak, hr	16.9
Surface Area[3], ac	14.1
Storage[4], ac-ft	47.5

Notes:
[1]Elevations are based on the NAVD88 datum
[2]Approximate Berm Minimum Elevation confirmed by DMG
[3]Surface Area is defined as the water surface area at the PWSE
[4]Storage is defined as the volume between the SWSE and PWSE

CLOSING

This letter has been prepared to document Geosyntec's evaluation of changes that have occurred at the BAP at the BPP since the Initial HoC was developed, based on reasonably and readily available information provided by DMG, observed by Geosyntec during the site visit, or generated by Geosyntec as part of subsequent calculations.

Sincerely,

Thomas Ward, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

REFERENCES

[1] AECOM, "History of Construction, USEPA 40 CFR § 257.73(c), Baldwin Power Plant, Baldwin, Illinois," October 2016.

[2] United Stated Environmental Protection Agency, "40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule, 2015," 2015.

[3] Illinois Environmental Protection Agency, "35 Ill. Adm. Code Part 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments," Springfield, IL, 2021.

[4] V. Modeer, "Closure Plan for Existing CCR Surface Impoundment, 40 CFR 257.102(b), Baldwin Power Plant, Dynegy Midwest Generation, LLC, Old East Fly Ash Pond," October 17, 2016.

[5] V. Modeer, "Closure Plan for Existing CCR Surface Impoundment, 40 CFR 257.102(b), Baldwin Power Plant, Dynegy Midwest Generation, LLC, East Fly Ash Pond," October 17, 2020.

[6] V. Modeer, "Closure Plan for Existing CCR Surface Impoundment, 40 CFR 257.102(b), Baldwin Power Plant, Dynegy Midwest Generation, LLC, West Fly Ash Pond," October 17, 2016.

[7] Tickner, Diana, "Baldwin Energy Complex; Old East Fly Ash Pond, East Fly Ash Pond, West Ash Pond; Notification of Completion of Closure," Luminant, December 17, 2020.

[8] P. Morris, "Baldwin Power Plant; Old East Fly Ash Pond, East Fly Ash Pond, West Ash Pond, Notification of Completion of Closure," Luminant, December 17, 2020.

Attachment D

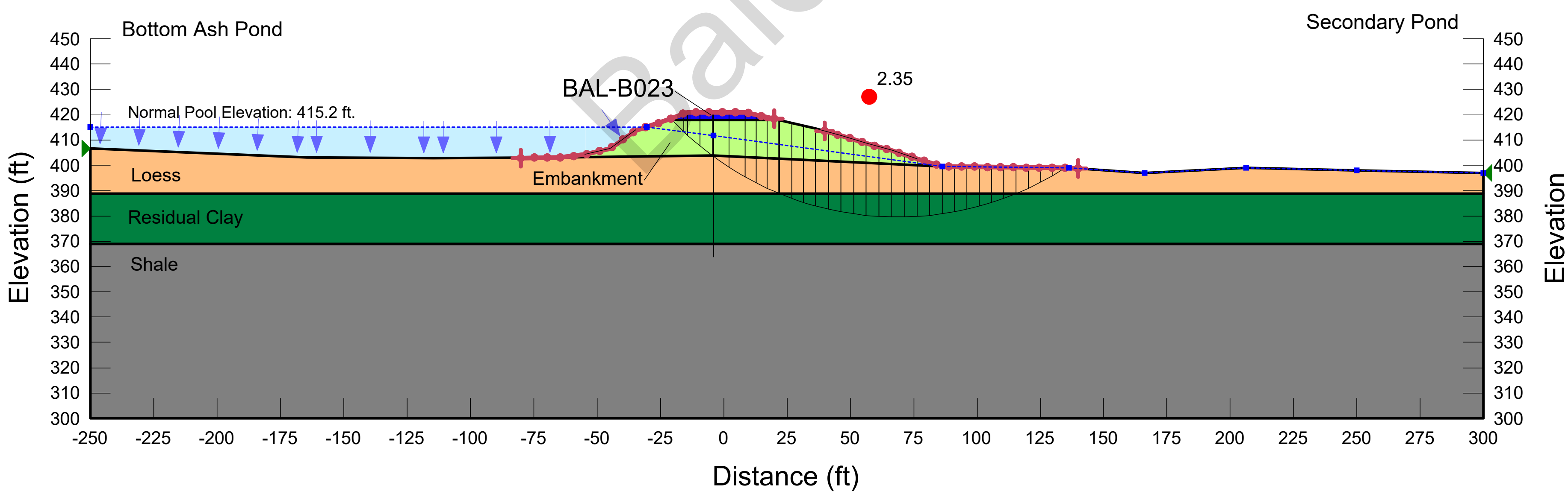
Periodic Structural Stability and Safety Factor Assessment Analyses

Baldwin Power Plant
Bottom Ash Pond - Section 9

Calculated by: MJN   Date: 07/28/2016
Reviewed by: BT   Date:07/28/2016
Checked by: LPC   Date: 07/28/2016
Modified by: PK   Date: 10/12/2021
Checked by:ZF   Date: 10/12/2021

Name: Static Stability - Normal Pool
Kind: SLOPE/W
Method: Spencer

Name: Embankment Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 100 psf Phi': 28 °
Name: Residual Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: Shale Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 1,000 psf Phi': 28 °
Name: Loess Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: Gravel (Dike Raise) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 35 °



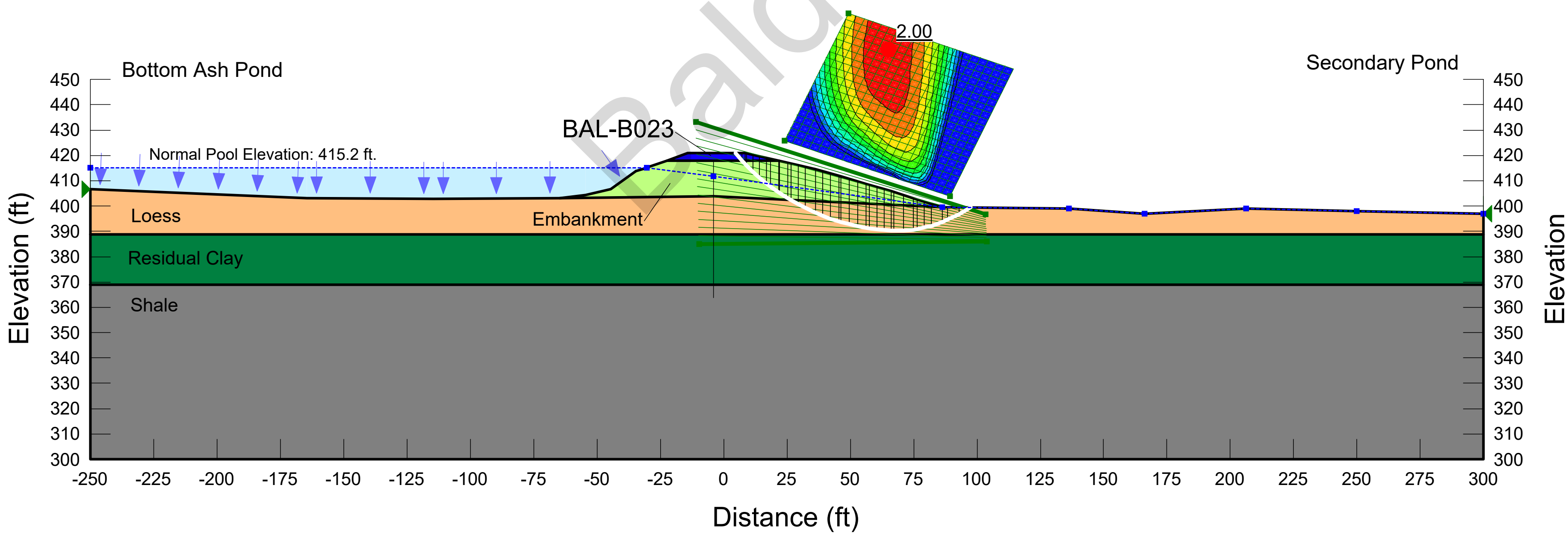
\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\501_BEC\501d_Full_Cert_Rpt\Revised SFA\Re-runs 2021\

Baldwin Power Plant
Bottom Ash Pond - Section 9

Calculated by: MJN Date: 07/28/2016
Reviewed by: BT Date:07/28/2016
Checked by: LPC Date: 07/28/2016
Modified by: PK Date: 10/12/2021
Checked by:ZF Date: 10/12/2021

Name: Static Stability - Normal Pool (grid&radius)
Kind: SLOPE/W
Method: Spencer

Name: Embankment Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 100 psf Phi': 28 °
Name: Residual Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: Shale Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 1,000 psf Phi': 28 °
Name: Loess Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: Gravel (Dike Raise) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 35 °



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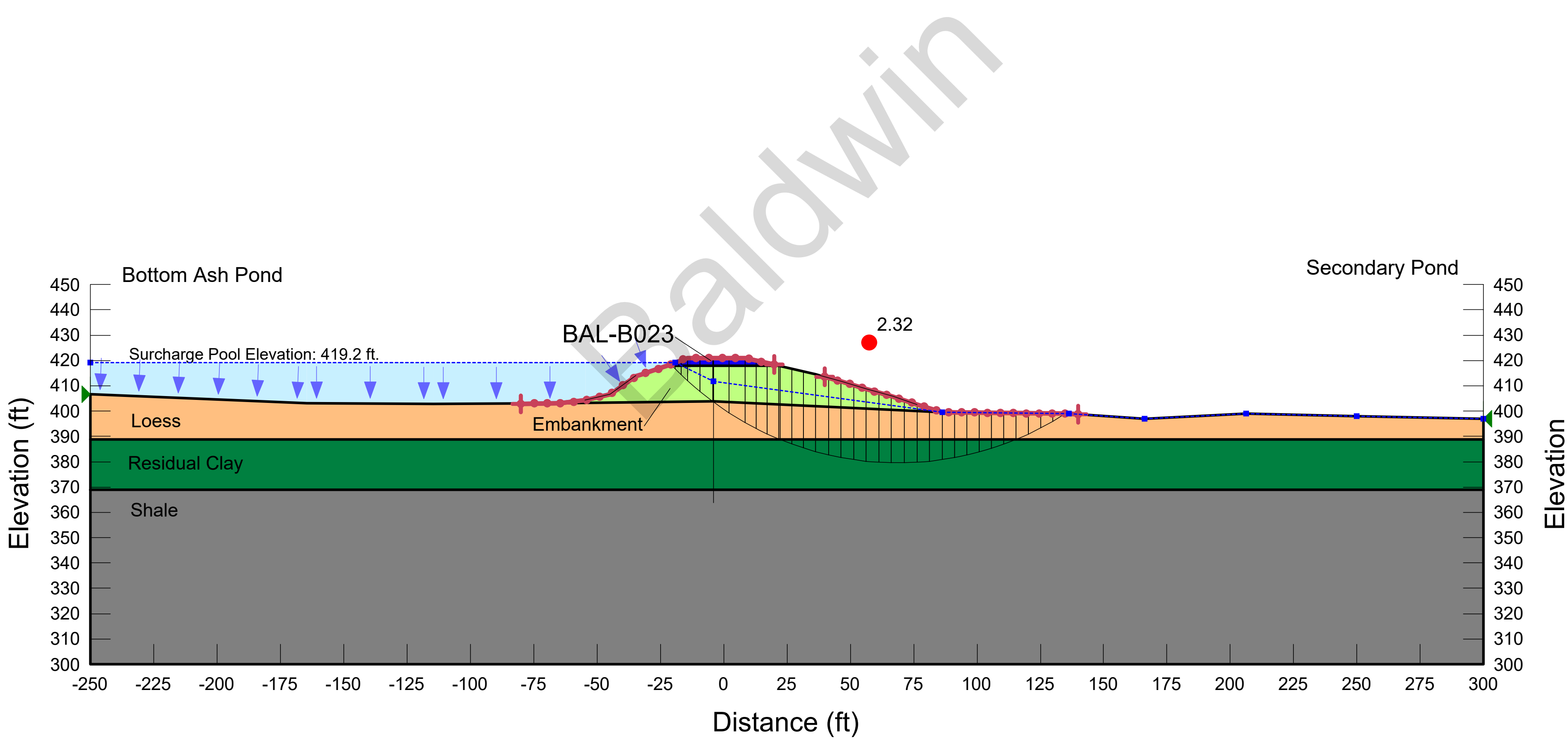
Baldwin Power Plant
Bottom Ash Pond - Section 9

Calculated by: MJN Date: 07/28/2016
Reviewed by: BT Date:07/28/2016
Checked by: LPC Date: 07/28/2016
Modified by: PK Date: 10/12/2021
Checked by:ZF Date: 10/12/2021

Name: Static Stability - Surcharge Pool
Kind: SLOPE/W
Method: Spencer

Name: Embankment Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 100 psf Phi': 28 °
Name: Residual Clay Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: Shale Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 1,000 psf Phi': 28 °
Name: Loess Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 100 psf Phi': 28 °
Name: Gravel (Dike Raise) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 35 °



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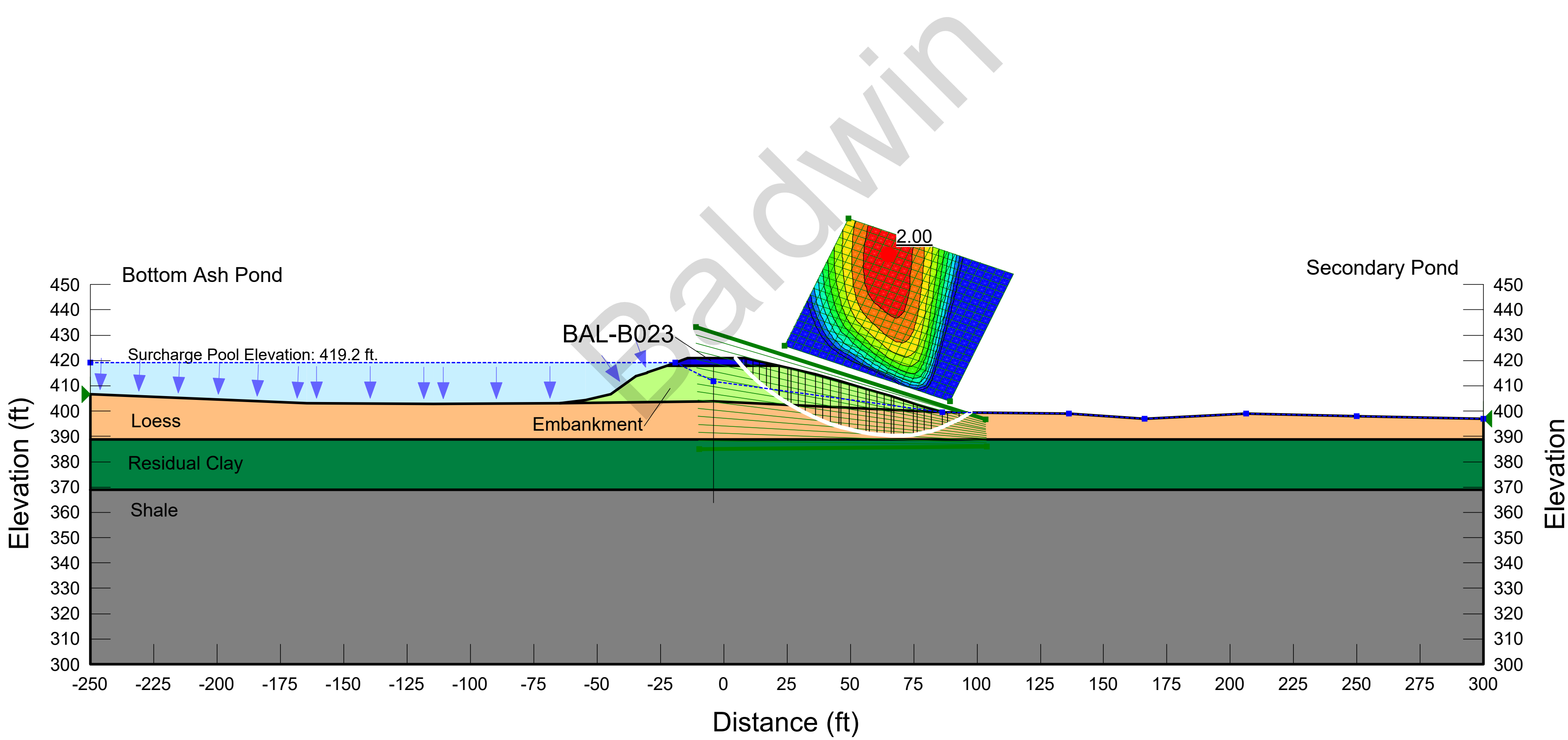
Baldwin Power Plant
Bottom Ash Pond - Section 9

Calculated by: MJN	Date: 07/28/2016
Reviewed by: BT	Date:07/28/2016
Checked by: LPC	Date: 07/28/2016
Modified by: PK	Date: 10/12/2021
Checked by:ZF	Date: 10/12/2021

Name: Static Stability - Surcharge Pool (grid&radius)
Kind: SLOPE/W
Method: Spencer

Name: Embankment	Model: Mohr-Coulomb	Unit Weight: 115 pcf	Cohesion': 100 psf	Phi': 28 °
Name: Residual Clay	Model: Mohr-Coulomb	Unit Weight: 120 pcf	Cohesion': 100 psf	Phi': 28 °
Name: Shale	Model: Mohr-Coulomb	Unit Weight: 125 pcf	Cohesion': 1,000 psf	Phi': 28 °
Name: Loess	Model: Mohr-Coulomb	Unit Weight: 120 pcf	Cohesion': 100 psf	Phi': 28 °
Name: Gravel (Dike Raise)	Model: Mohr-Coulomb	Unit Weight: 130 pcf	Cohesion': 0 psf	Phi': 35 °



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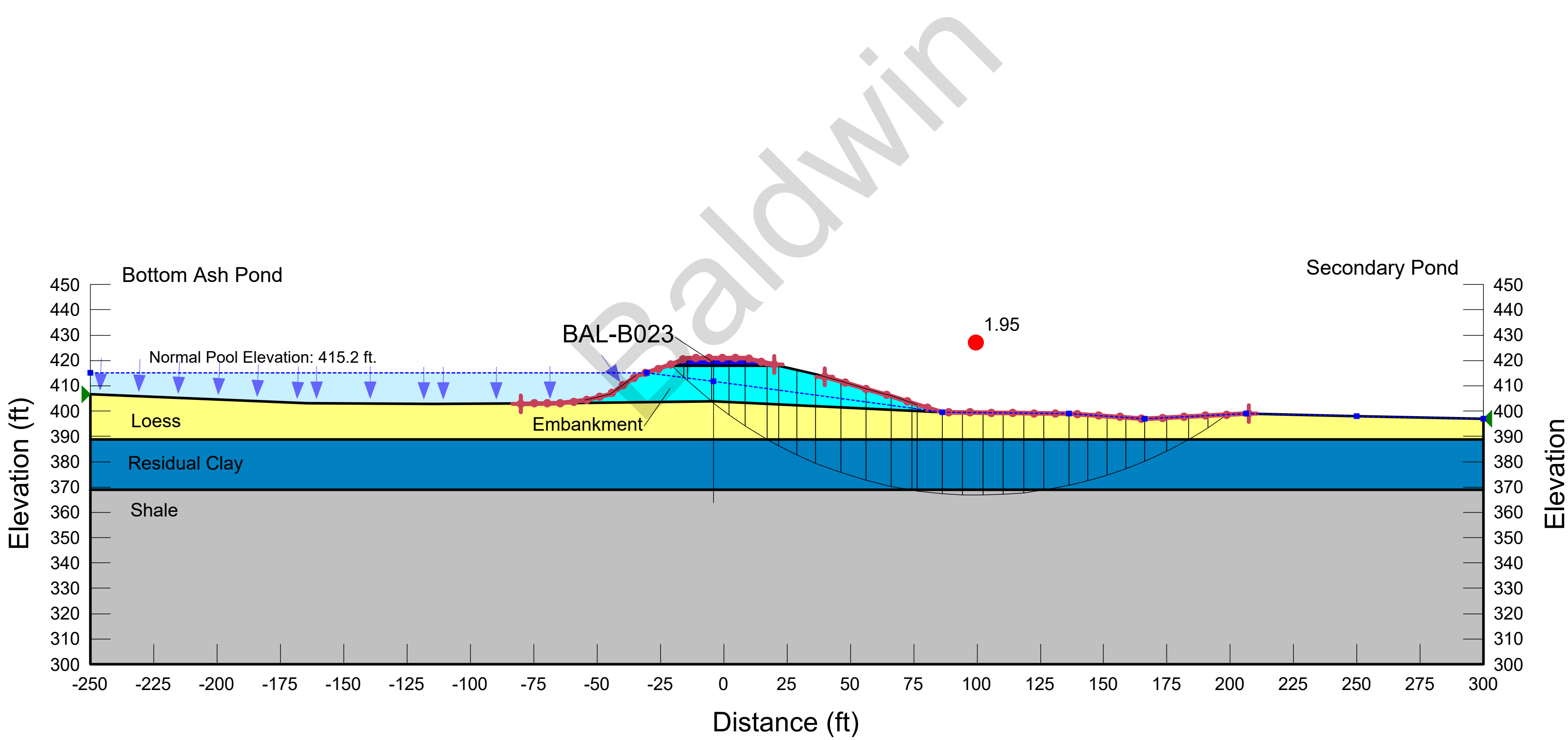
Baldwin Power Plant
Bottom Ash Pond - Section 9

Calculated by: MJN Date: 07/28/2016
Reviewed by: BT Date:07/28/2016
Checked by: LPC Date: 07/28/2016
Modified by: PK Date: 10/12/2021
Checked by:ZF Date: 10/12/2021

Name: Static Stability - Pseudo Static
Kind: SLOPE/W
Method: Spencer

Name: Embankment (undrained) Model: Mohr-Coulomb Unit Weight: 115 pcf Cohesion': 1,500 psf Phi': 0 °
Name: Residual Clay (undrained) Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 2,000 psf Phi': 0 °
Name: Shale (undrained) Model: Mohr-Coulomb Unit Weight: 125 pcf Cohesion': 4,000 psf Phi': 0 °
Name: Loess (undrained) Model: Mohr-Coulomb Unit Weight: 120 pcf Cohesion': 1,500 psf Phi': 0 °
Name: Gravel (Dike Raise) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 35 °

Seismic Horizontal Coefficent (kh) = 0.36g



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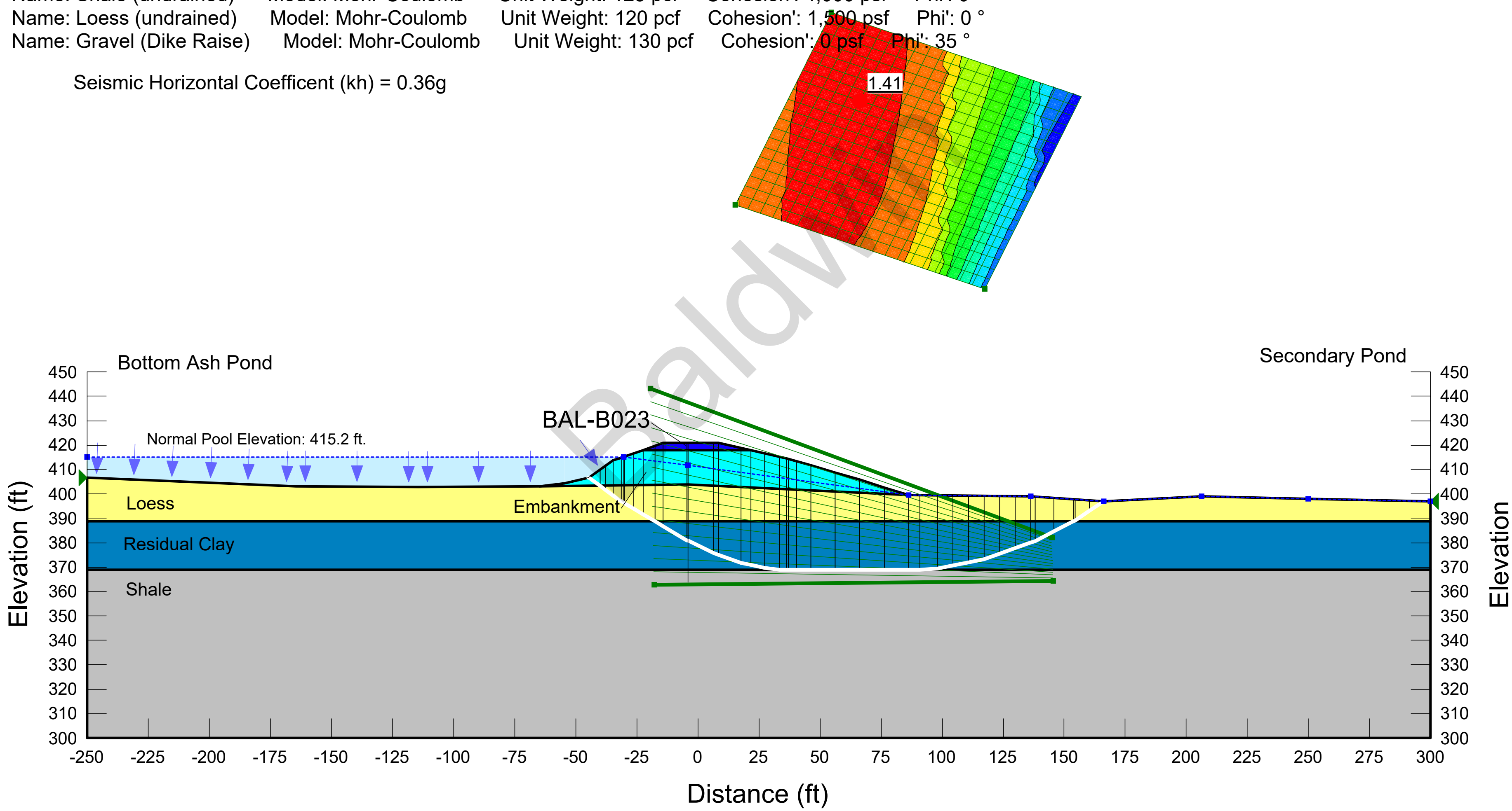
Baldwin Power Plant
Bottom Ash Pond - Section 9

Calculated by: MJN   Date: 07/28/2016
Reviewed by: BT   Date:07/28/2016
Checked by: LPC   Date: 07/28/2016
Modified by: PK   Date: 10/12/2021
Checked by:ZF   Date: 10/12/2021

Name: Static Stability - Pseudo Static (grid&radius)
Kind: SLOPE/W
Method: Spencer

Name: Embankment (undrained)	Model: Mohr-Coulomb	Unit Weight: 115 pcf	Cohesion': 1,500 psf	Phi': 0 °
Name: Residual Clay (undrained)	Model: Mohr-Coulomb	Unit Weight: 120 pcf	Cohesion': 2,000 psf	Phi': 0 °
Name: Shale (undrained)	Model: Mohr-Coulomb	Unit Weight: 125 pcf	Cohesion': 4,000 psf	Phi': 0 °
Name: Loess (undrained)	Model: Mohr-Coulomb	Unit Weight: 120 pcf	Cohesion': 1,500 psf	Phi': 0 °
Name: Gravel (Dike Raise)	Model: Mohr-Coulomb	Unit Weight: 130 pcf	Cohesion': 0 psf	Phi': 35 °

Seismic Horizontal Coefficent (kh) = 0.36g



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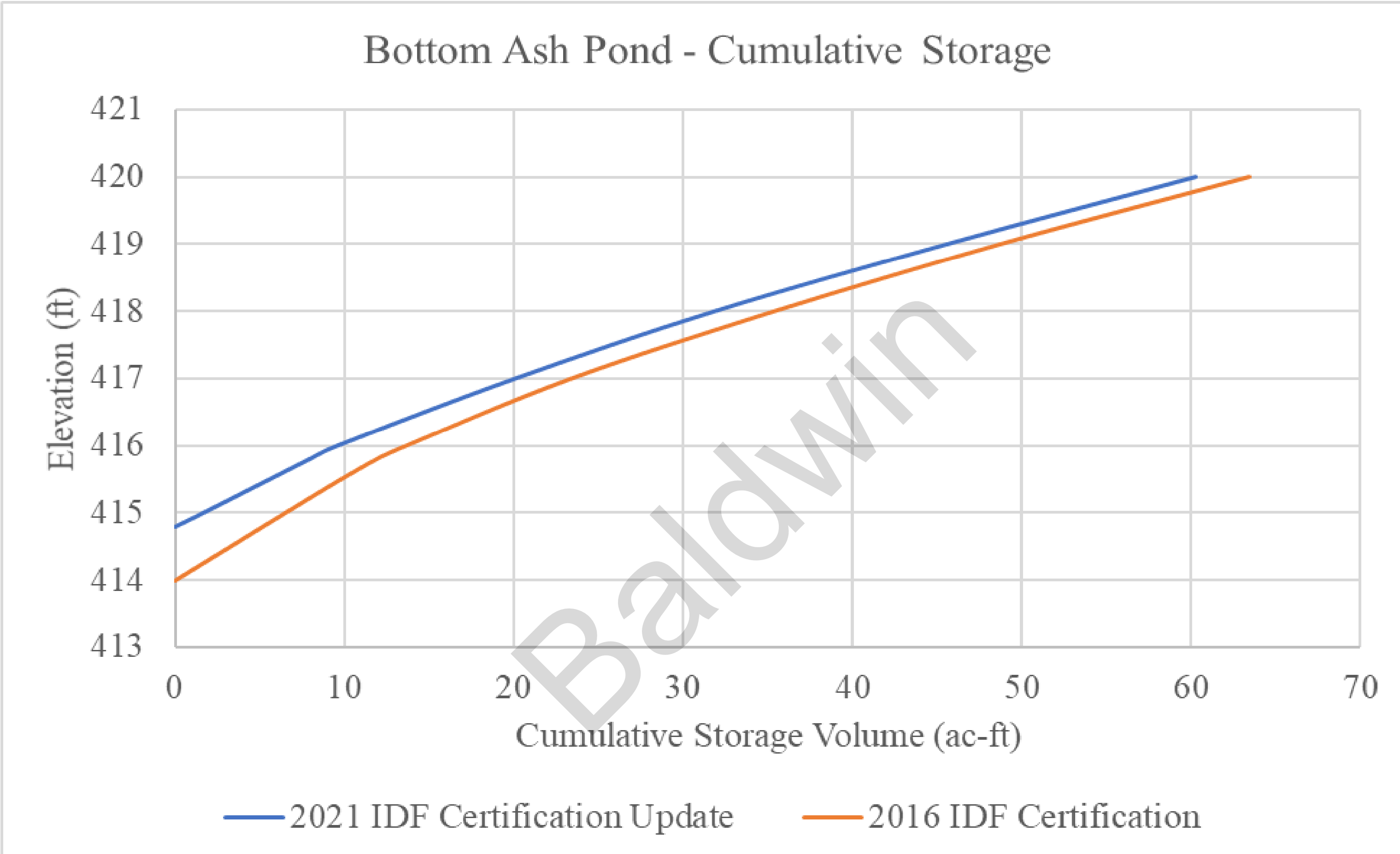
Attachment E

Periodic Inflow Design Flood Control System Plan Analyses

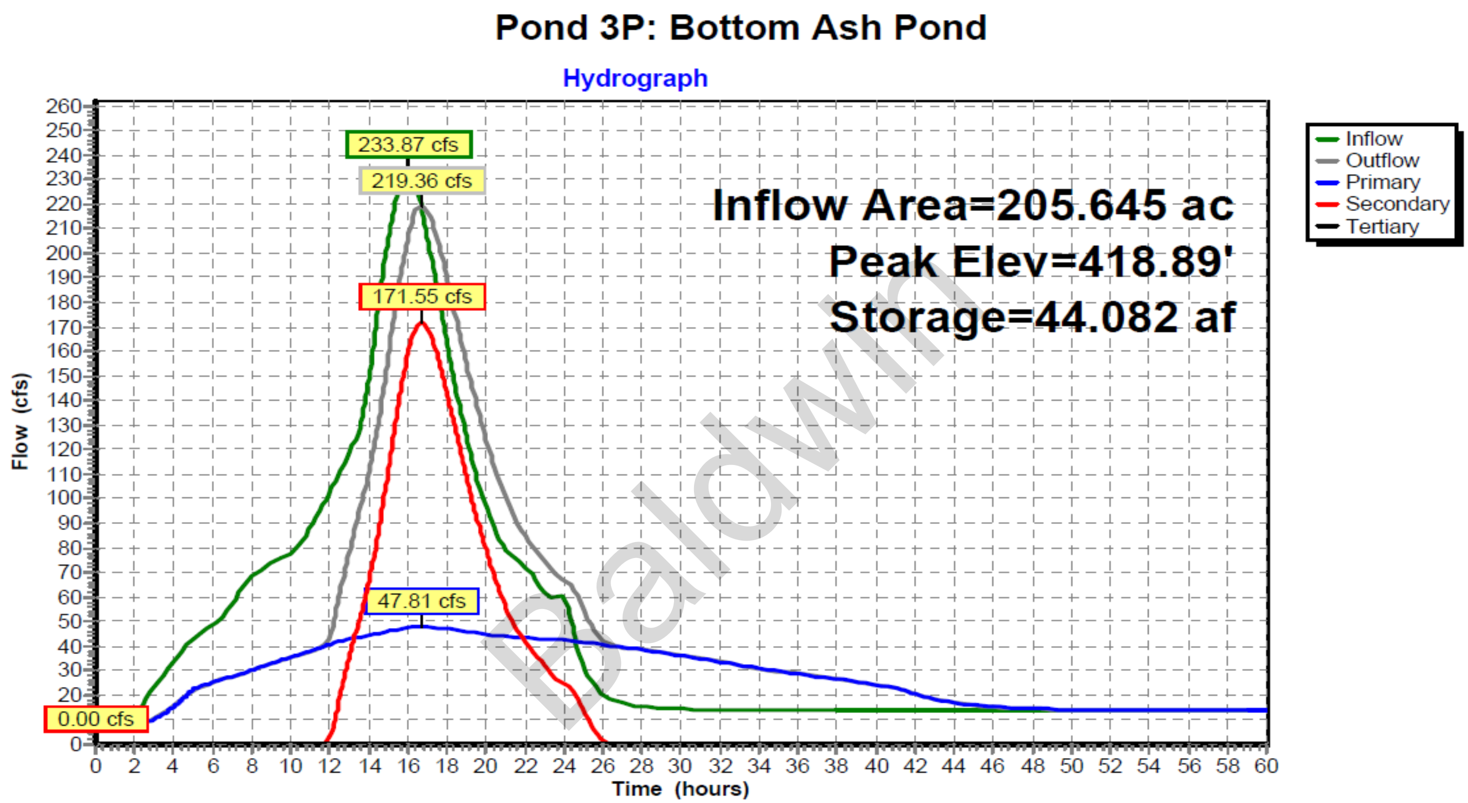


BOTTOM ASH POND CUMULATIVE STORAGE
PERIODIC CERTIFICATION
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

Geosyntec consultants

Figure E-1

GLP8027 | 9/16/2021



BOTTOM ASH POND IDF HYDROGRAPH
PERIODIC CERTIFICATION
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

Geosyntec consultants

Figure E-2

GLP8027 9/16/2021

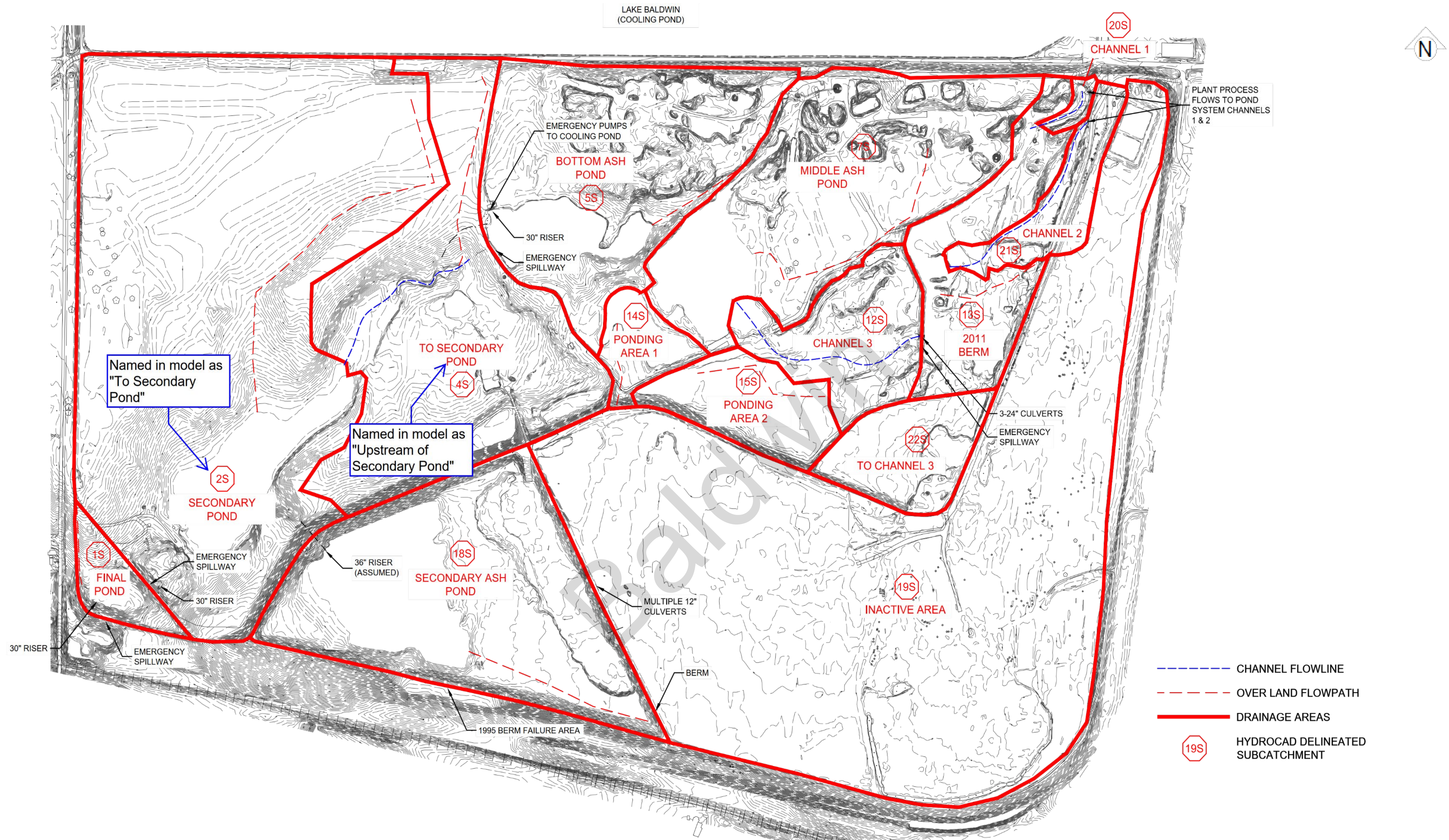


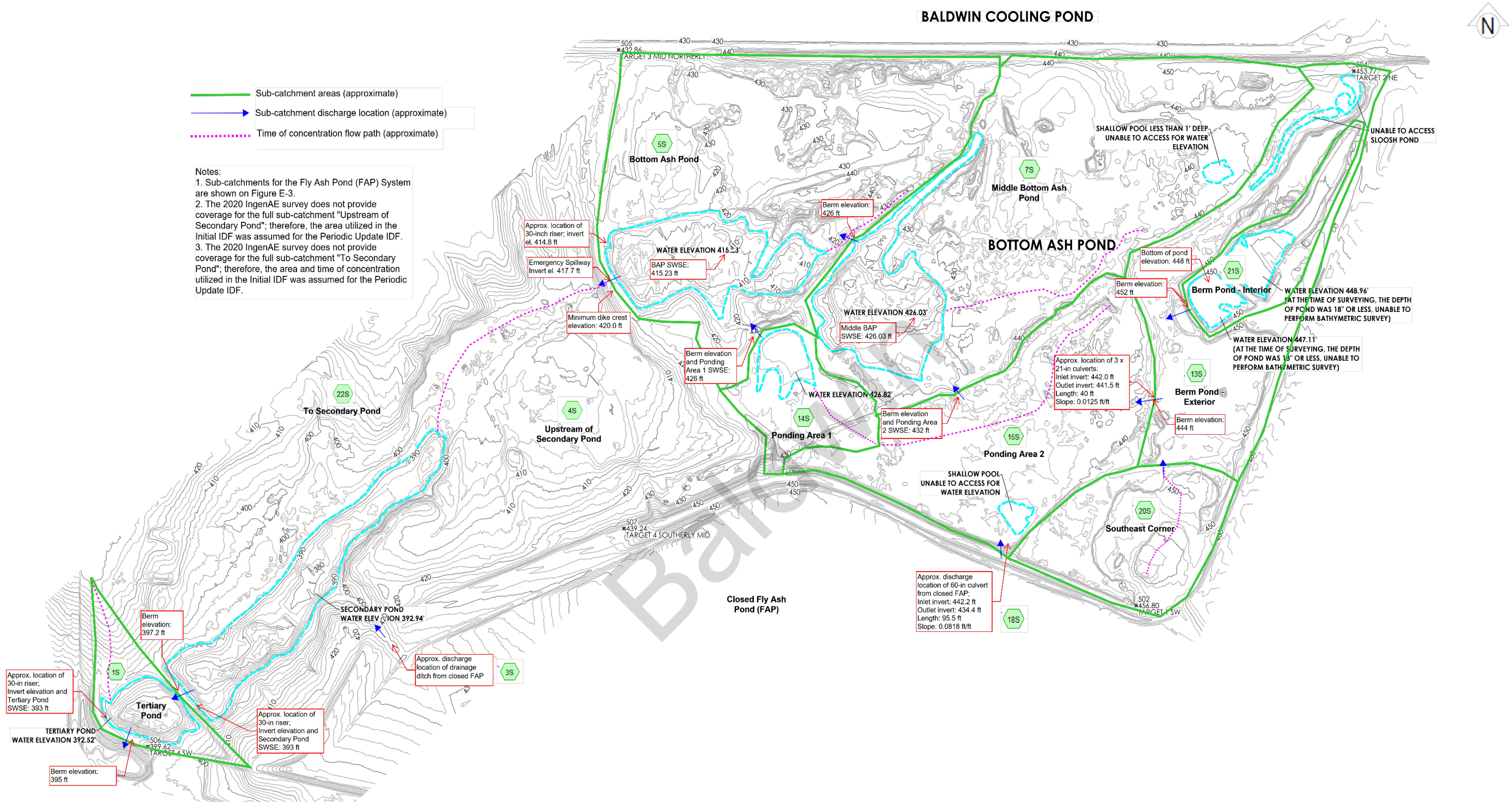
Figure based on AECOM Drainage Area Map, October 2013 (from: *CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Constrol System Plan for Bottom Ash Pond at Baldwin Energy Complex", October 2016)*

NOT FOR CONSTRUCTION - NOT TO SCALE

Baldwin Energy Complex
Bottom Ash Pond Complex
Initial IDF Delineations

Geosyntec consultants

GLP8027	September 2021	Figure E-3



Notes:
1. Sub-catchments for the Fly Ash Pond (FAP) System are shown on Figure E-3.
2. The 2020 IngenAE survey does not provide coverage for the full sub-catchment "Upstream of Secondary Pond"; therefore, the area utilized in the Initial IDF was assumed for the Periodic Update IDF.
3. The 2020 IngenAE survey does not provide coverage for the full sub-catchment "To Secondary Pond"; therefore, the area and time of concentration utilized in the Initial IDF was assumed for the Periodic Update IDF.

Figure based on IngenAE 2020 Site Topo

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Baldwin Energy Complex Bottom Ash Pond Complex Hydrologic Workmap - Part I	
Geosyntec consultants	Figure
GLP8027 September 2021	E-4

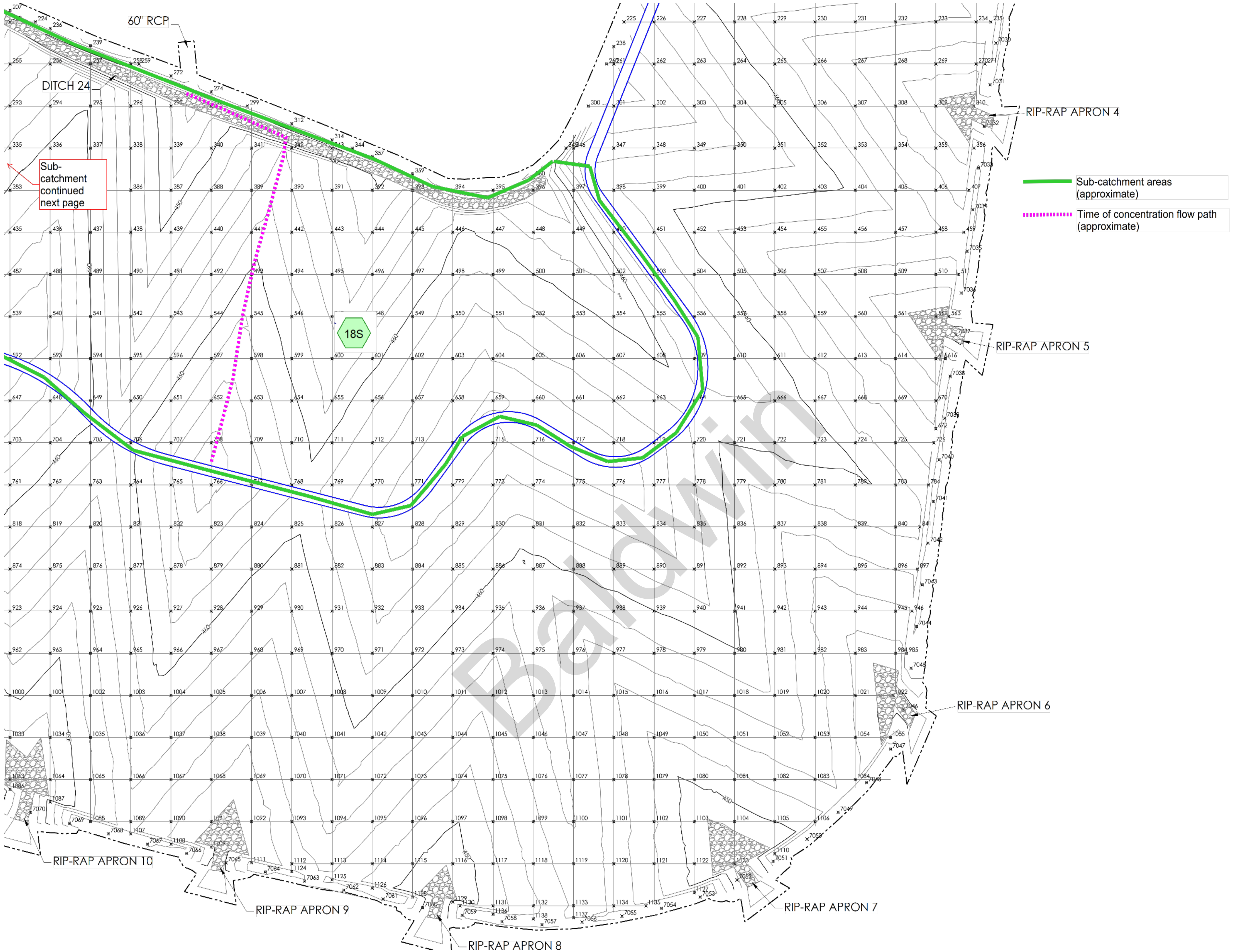

Figure based on IngenAE 2020 As-Built Drawings for Fly Ash Pond Closure

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Baldwin Energy Complex
Bottom Ash Pond Complex
Hydrologic Workmap - Part 2

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GLP8027	September 2021	Figure E-5

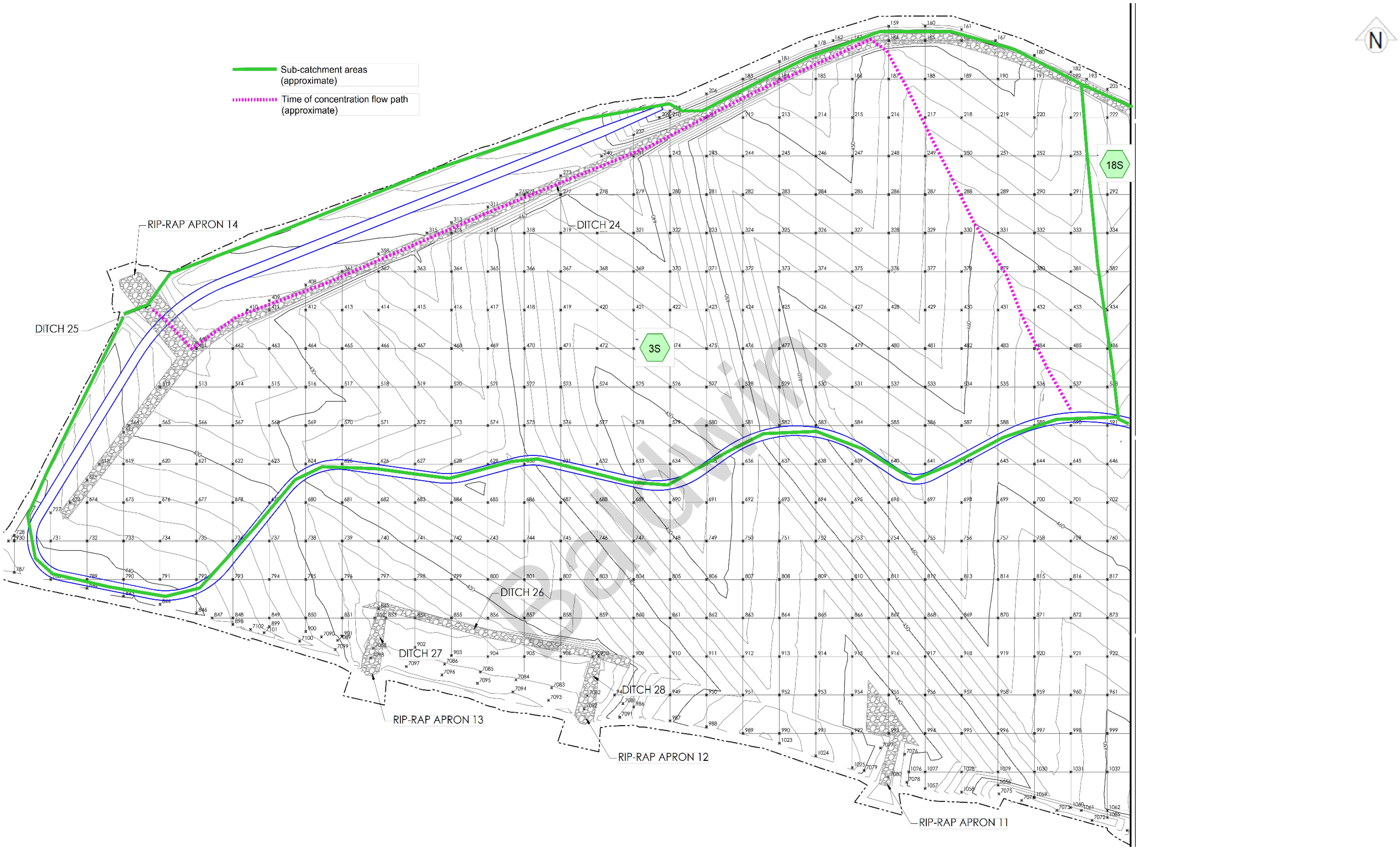

Figure based on IngenAE 2020 As-Built Drawings for Fly Ash Pond Closure

NOT FOR CONSTRUCTION - NOT TO SCALE

Baldwin Energy Complex
Bottom Ash Pond Complex
Hydrologic Workmap - Part 3

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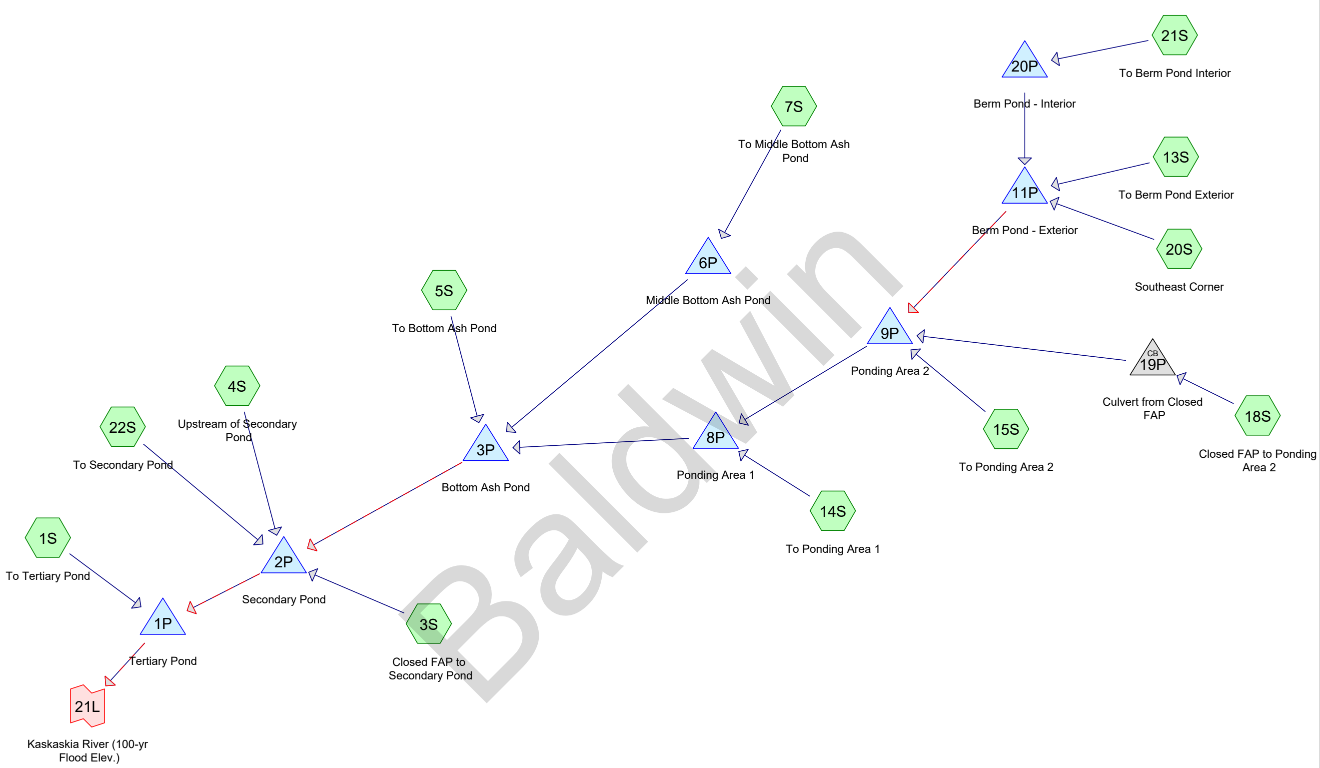
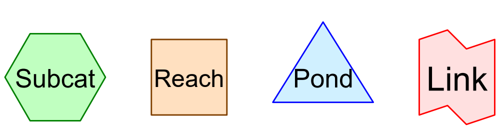
GLP8027 | September 2021

Figure E-6





Routing Diagram for 2021-08_Baldwin_H&H Model_Periodic Review_r4
Prepared by SCCM, Printed 10/7/2021
HydroCAD® 10.00-26 s/n 00928 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
149.419	89	<50% Grass cover, Poor, HSG D (5S, 7S, 13S, 14S, 15S, 20S)
93.418	74	>75% Grass cover, Good, HSG C (1S, 3S, 18S)
4.547	91	Urban industrial, 72% imp, HSG C (21S)
20.473	98	Water Surface, HSG B (1S, 7S, 14S, 22S)
10.151	98	Water Surface, HSG C (5S, 21S)
0.661	98	Water Surface, HSG D (13S)
180.400	76	Woods/grass comb., Fair, HSG C (4S, 22S)
459.069	**81**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
20.473	HSG B	1S, 7S, 14S, 22S
288.516	HSG C	1S, 3S, 4S, 5S, 18S, 21S, 22S
150.081	HSG D	5S, 7S, 13S, 14S, 15S, 20S
0.000	Other	
459.069		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	149.419	0.000	149.419	<50% Grass cover, Poor	5S, 7S, 13S, 14S, 15S, 20S
0.000	0.000	93.418	0.000	0.000	93.418	>75% Grass cover, Good	1S, 3S, 18S
0.000	0.000	4.547	0.000	0.000	4.547	Urban industrial, 72% imp	21S
0.000	20.473	10.151	0.661	0.000	31.285	Water Surface	1S, 5S, 7S, 13S, 14S, 21S, 22S
0.000	0.000	180.400	0.000	0.000	180.400	Woods/grass comb., Fair	4S, 22S
0.000	**20.473**	**288.516**	**150.081**	**0.000**	**459.069**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	371.00	368.00	173.0	0.0173	0.025	30.0	0.0	0.0
2	2P	380.00	379.01	379.0	0.0026	0.025	30.0	0.0	0.0
3	3P	410.00	399.16	500.0	0.0217	0.013	30.0	0.0	0.0
4	11P	442.00	441.50	40.0	0.0125	0.011	21.0	0.0	0.0
5	19P	442.22	434.41	95.5	0.0818	0.011	60.0	0.0	0.0

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: To Tertiary Pond Runoff Area=5.621 ac 40.65% Impervious Runoff Depth=9.20"
Flow Length=605' Tc=13.1 min CN=84 Runoff=6.60 cfs 4.309 af

Subcatchment 3S: Closed FAP to Runoff Area=2,539,675 sf 0.00% Impervious Runoff Depth=7.86"
Flow Length=3,341' Tc=34.1 min CN=74 Runoff=62.00 cfs 38.212 af

Subcatchment 4S: Upstream of Secondary Runoff Area=56.800 ac 0.00% Impervious Runoff Depth=8.14"
Flow Length=1,238' Tc=67.0 min CN=76 Runoff=59.85 cfs 38.515 af

Subcatchment 5S: To Bottom Ash Pond Runoff Area=2,047,011 sf 16.39% Impervious Runoff Depth=9.97"
Flow Length=628' Tc=18.2 min CN=90 Runoff=56.71 cfs 39.039 af

Subcatchment 7S: To Middle Bottom Runoff Area=2,257,840 sf 14.88% Impervious Runoff Depth=9.97"
Flow Length=1,173' Tc=39.6 min CN=90 Runoff=61.76 cfs 43.059 af

Subcatchment 13S: To Berm Pond Exterior Runoff Area=947,118 sf 3.04% Impervious Runoff Depth=9.84"
Tc=6.0 min CN=89 Runoff=26.31 cfs 17.833 af

Subcatchment 14S: To Ponding Area 1 Runoff Area=306,270 sf 19.53% Impervious Runoff Depth=10.09"
Flow Length=320' Tc=10.9 min CN=91 Runoff=8.55 cfs 5.915 af

Subcatchment 15S: To Ponding Area 2 Runoff Area=1,166,807 sf 0.00% Impervious Runoff Depth=9.84"
Flow Length=1,510' Tc=24.5 min CN=89 Runoff=32.07 cfs 21.970 af

Subcatchment 18S: Closed FAP to Runoff Area=1,384,293 sf 0.00% Impervious Runoff Depth=7.86"
Flow Length=1,068' Tc=18.3 min CN=74 Runoff=34.20 cfs 20.828 af

Subcatchment 20S: Southeast Corner Runoff Area=543,865 sf 0.00% Impervious Runoff Depth=9.84"
Flow Length=848' Tc=15.1 min CN=89 Runoff=15.03 cfs 10.240 af

Subcatchment 21S: To Berm Pond Runoff Area=304,702 sf 81.80% Impervious Runoff Depth=10.34"
Tc=6.0 min CN=93 Runoff=8.58 cfs 6.030 af

Subcatchment 22S: To Secondary Pond Runoff Area=132.700 ac 6.86% Impervious Runoff Depth=8.41"
Flow Length=2,578' Tc=55.2 min CN=78 Runoff=144.31 cfs 92.963 af

Pond 1P: Tertiary Pond Peak Elev=396.64' Storage=9.714 af Inflow=456.41 cfs 339.538 af
Primary=30.33 cfs 101.892 af Secondary=425.80 cfs 235.698 af Outflow=456.13 cfs 337.590 af

Pond 2P: Secondary Pond Peak Elev=398.60' Storage=90.020 af Inflow=469.47 cfs 393.827 af
Primary=18.95 cfs 69.684 af Secondary=437.28 cfs 265.545 af Outflow=451.60 cfs 335.229 af

Pond 3P: Bottom Ash Pond Peak Elev=419.13' Storage=47.536 af Inflow=233.87 cfs 225.955 af
Primary=49.20 cfs 139.275 af Secondary=162.95 cfs 84.862 af Tertiary=0.00 cfs 0.000 af Outflow=212.15 cfs 224.137 af

Pond 6P: Middle Bottom Ash Pond Peak Elev=426.57' Storage=4.616 af Inflow=61.76 cfs 43.059 af
Outflow=58.61 cfs 43.290 af

Pond 8P: Ponding Area 1 Peak Elev=426.91' Storage=1.384 af Inflow=114.91 cfs 107.921 af
Outflow=114.74 cfs 107.712 af

Pond 9P: Ponding Area 2 Peak Elev=433.01' Storage=2.369 af Inflow=108.03 cfs 102.366 af
Outflow=106.88 cfs 102.007 af

Pond 11P: Berm Pond - Exterior Peak Elev=443.99' Storage=3.937 af Inflow=47.78 cfs 60.310 af
Primary=42.51 cfs 59.568 af Secondary=0.00 cfs 0.000 af Outflow=42.51 cfs 59.568 af

Pond 19P: Culvert from Closed FAP Peak Elev=444.19' Inflow=34.20 cfs 20.828 af
60.0" Round Culvert n=0.011 L=95.5' S=0.0818 '/' Outflow=34.20 cfs 20.828 af

Pond 20P: Berm Pond - Interior Peak Elev=451.17' Storage=6.030 af Inflow=8.58 cfs 6.030 af
Outflow=0.00 cfs 0.000 af

Link 21L: Kaskaskia River (100-yr Flood Elev.) Inflow=456.13 cfs 337.590 af
Primary=456.13 cfs 337.590 af

Total Runoff Area = 459.069 ac Runoff Volume = 338.913 af Average Runoff Depth = 8.86"
92.47% Pervious = 424.511 ac 7.53% Impervious = 34.559 ac

Summary for Subcatchment 1S: To Tertiary Pond

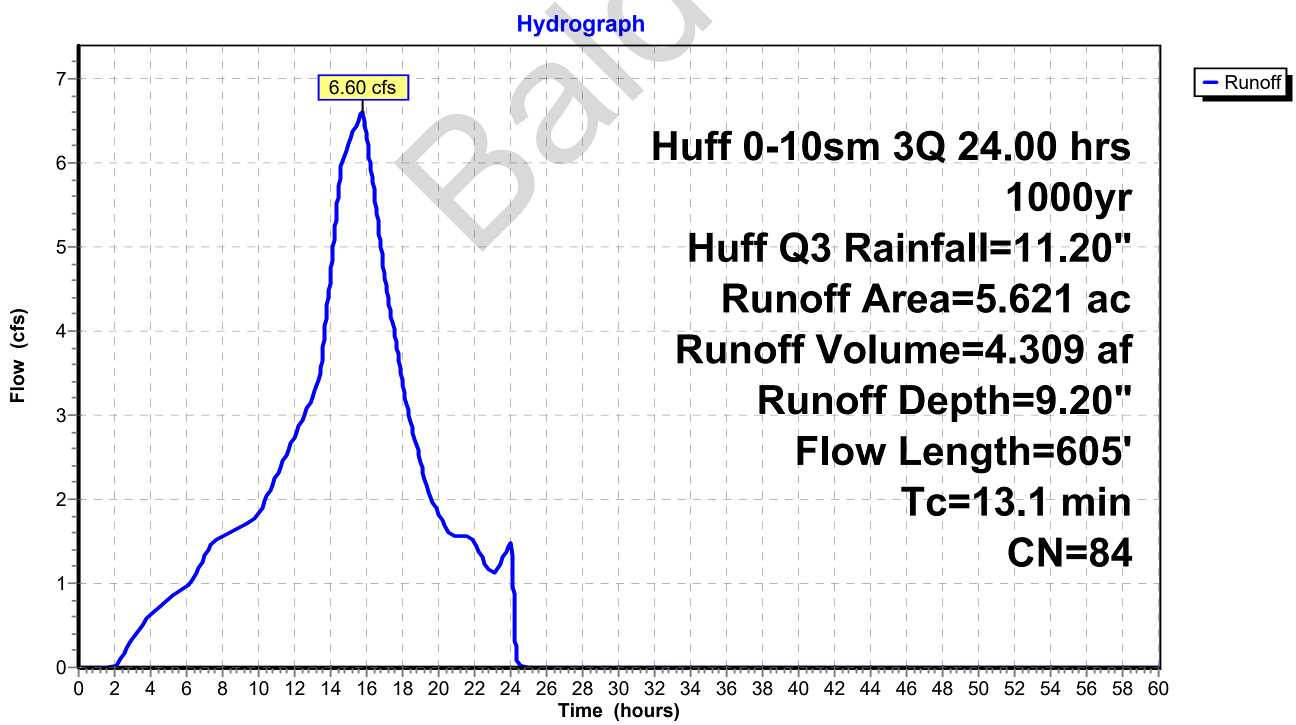
Runoff = 6.60 cfs @ 15.73 hrs, Volume= 4.309 af, Depth= 9.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (ac)	CN	Description
3.336	74	>75% Grass cover, Good, HSG C
2.285	98	Water Surface, HSG B
5.621	84	Weighted Average
3.336		59.35% Pervious Area
2.285		40.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0780	0.20		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.28"
4.9	505	0.0600	1.71		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
13.1	605	Total			

Subcatchment 1S: To Tertiary Pond



Summary for Subcatchment 3S: Closed FAP to Secondary Pond

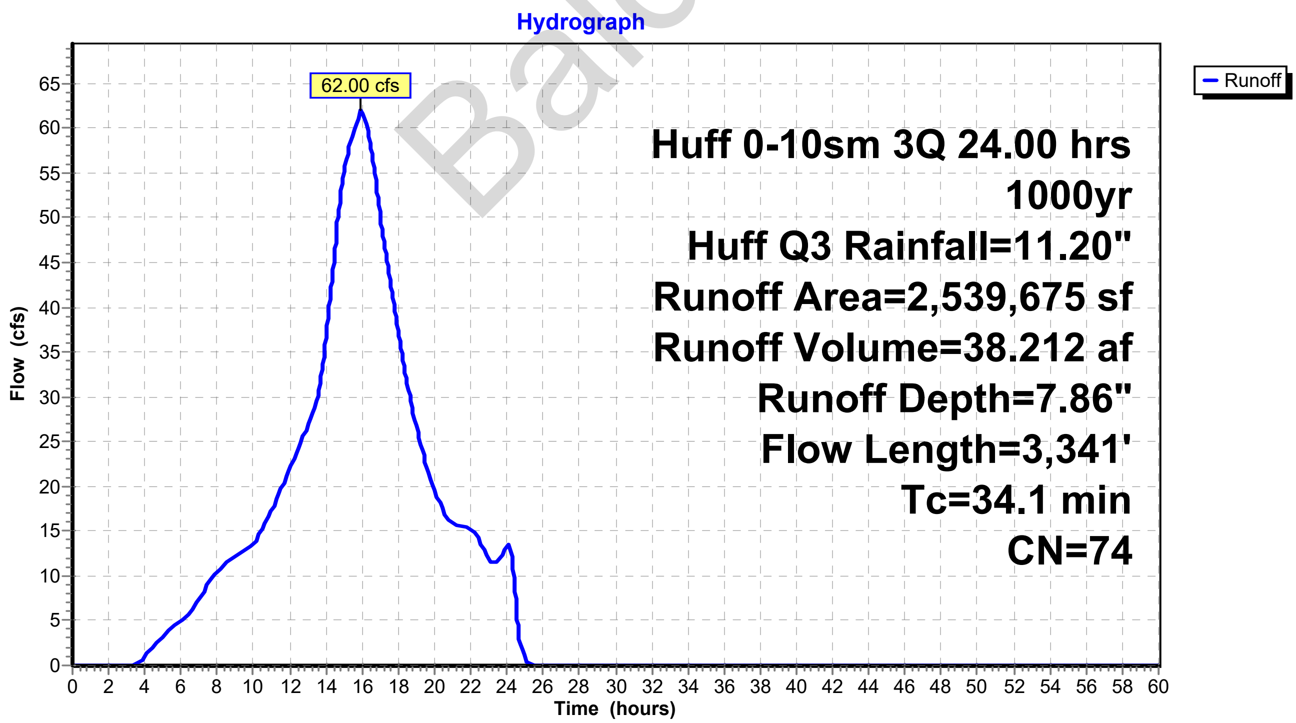
Runoff = 62.00 cfs @ 15.95 hrs, Volume= 38.212 af, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
2,539,675	74	>75% Grass cover, Good, HSG C
2,539,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	1,086	0.0130	0.80		**Shallow Concentrated Flow, Cover System** Short Grass Pasture Kv= 7.0 fps
11.1	2,080	0.0100	3.13	131.45	**Trap/Vee/Rect Channel Flow, Ditch 24 (Type A)** Bot.W=5.00' D=3.00' Z= 3.0 '/' Top.W=23.00' n= 0.069 Riprap, 6-inch
0.3	175	0.1000	9.46	539.15	**Trap/Vee/Rect Channel Flow, Ditch 25 (Type C)** Bot.W=10.00' D=3.00' Z= 3.0 '/' Top.W=28.00' n= 0.078 Riprap, 12-inch
34.1	3,341	Total			

Subcatchment 3S: Closed FAP to Secondary Pond



Summary for Subcatchment 4S: Upstream of Secondary Pond

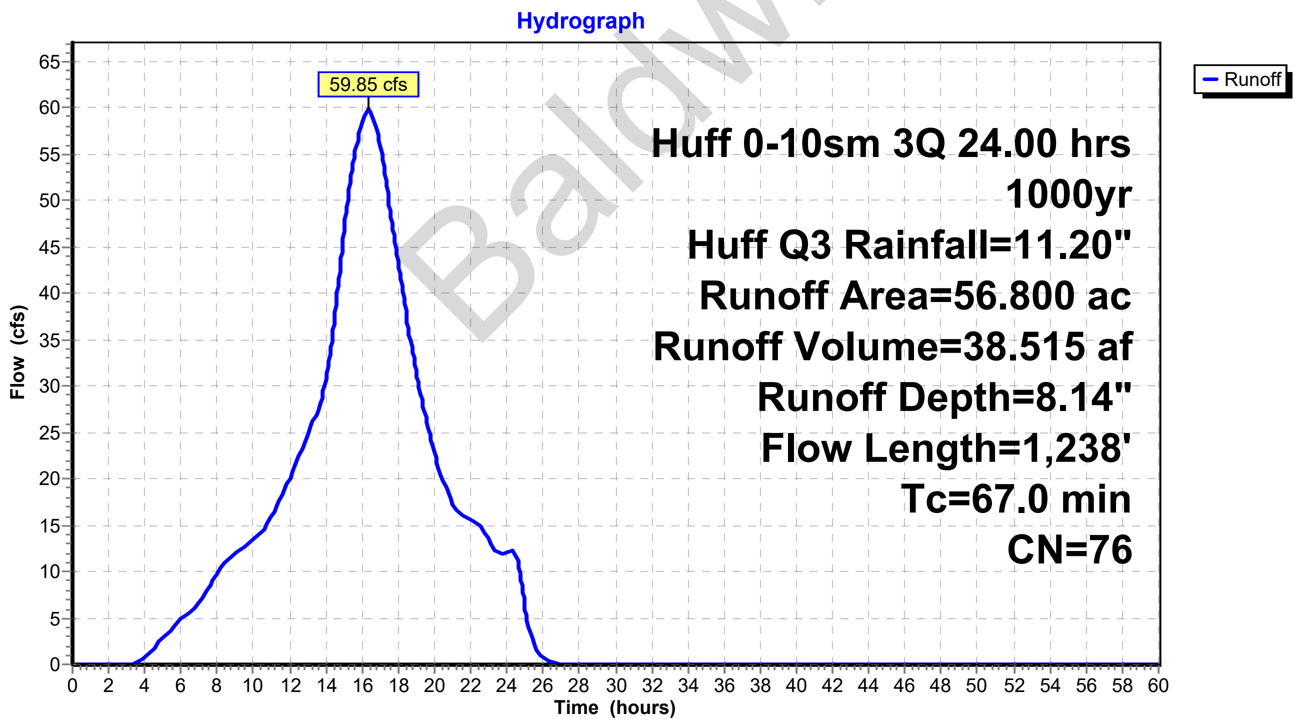
Runoff = 59.85 cfs @ 16.31 hrs, Volume= 38.515 af, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (ac)	CN	Description
56.800	76	Woods/grass comb., Fair, HSG C
56.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	55	0.0300	0.08		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.28"
55.8	1,183	0.0050	0.35		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
67.0	1,238	Total			

Subcatchment 4S: Upstream of Secondary Pond



Summary for Subcatchment 5S: To Bottom Ash Pond

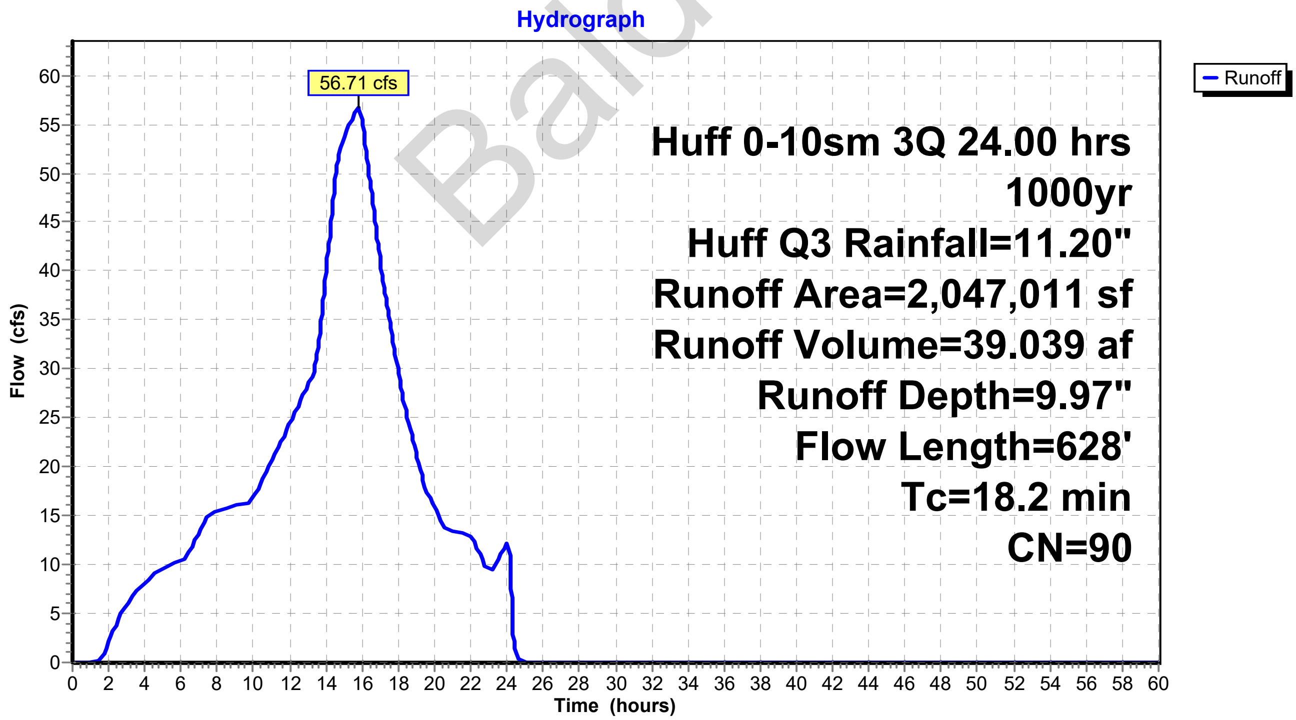
Runoff = 56.71 cfs @ 15.79 hrs, Volume= 39.039 af, Depth= 9.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
1,711,468	89	<50% Grass cover, Poor, HSG D
335,543	98	Water Surface, HSG C
2,047,011	90	Weighted Average
1,711,468		83.61% Pervious Area
335,543		16.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0460	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.28"
8.1	528	0.0240	1.08		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
18.2	628	Total			

Subcatchment 5S: To Bottom Ash Pond



Summary for Subcatchment 7S: To Middle Bottom Ash Pond

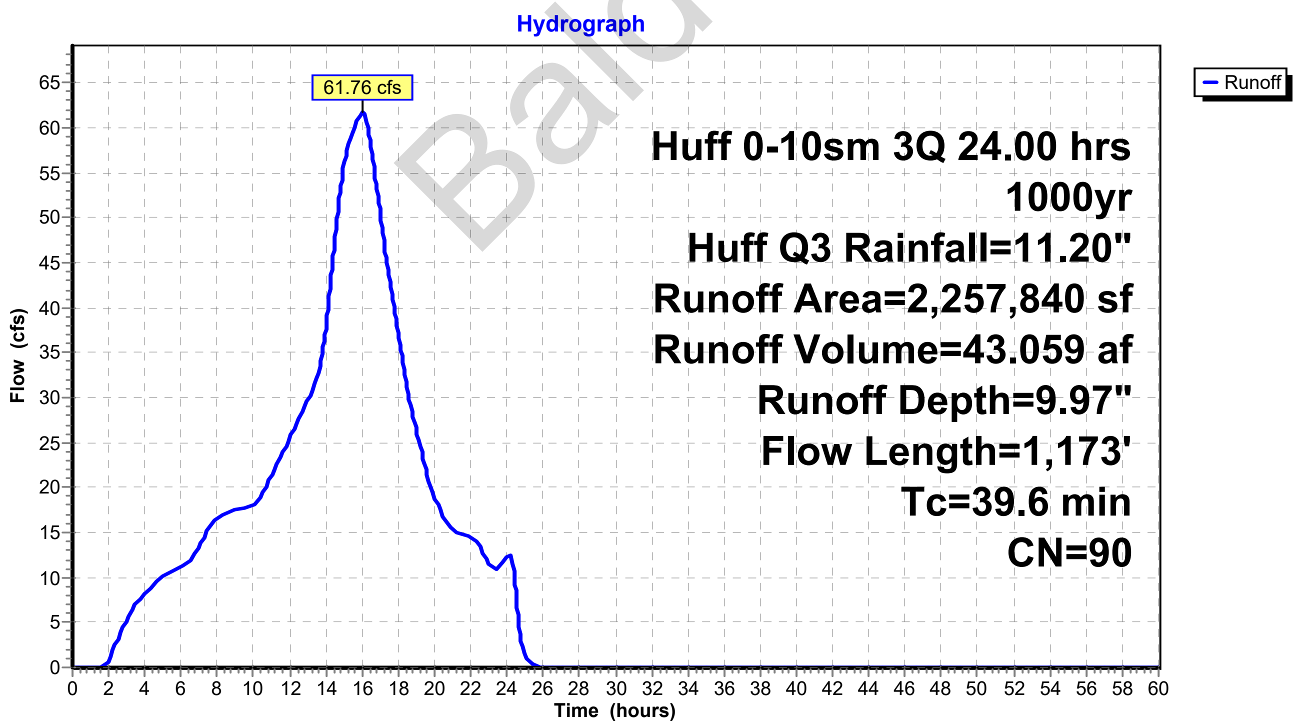
Runoff = 61.76 cfs @ 15.97 hrs, Volume= 43.059 af, Depth= 9.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
1,921,788	89	<50% Grass cover, Poor, HSG D
336,052	98	Water Surface, HSG B
2,257,840	90	Weighted Average
1,921,788		85.12% Pervious Area
336,052		14.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0260	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.28"
26.9	1,073	0.0090	0.66		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.6	1,173	Total			

Subcatchment 7S: To Middle Bottom Ash Pond



Summary for Subcatchment 13S: To Berm Pond Exterior

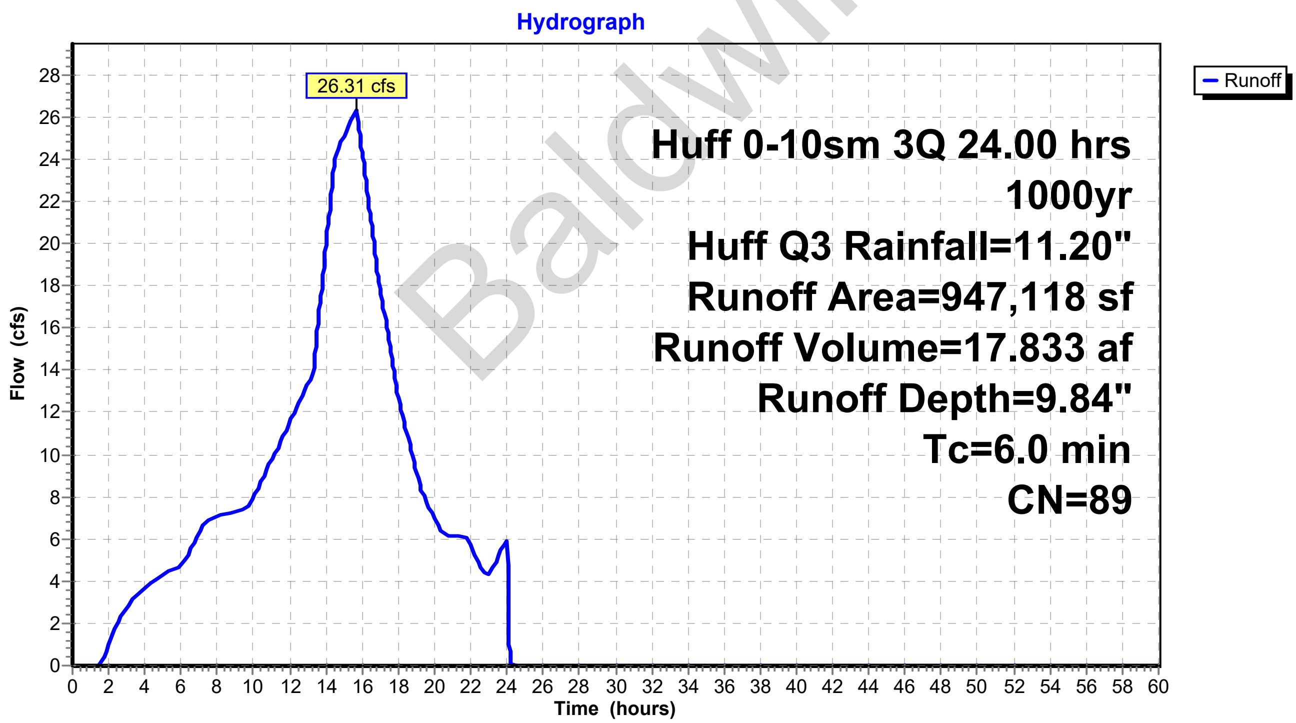
Runoff = 26.31 cfs @ 15.66 hrs, Volume= 17.833 af, Depth= 9.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
918,323	89	<50% Grass cover, Poor, HSG D
28,795	98	Water Surface, HSG D
947,118	89	Weighted Average
918,323		96.96% Pervious Area
28,795		3.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 13S: To Berm Pond Exterior



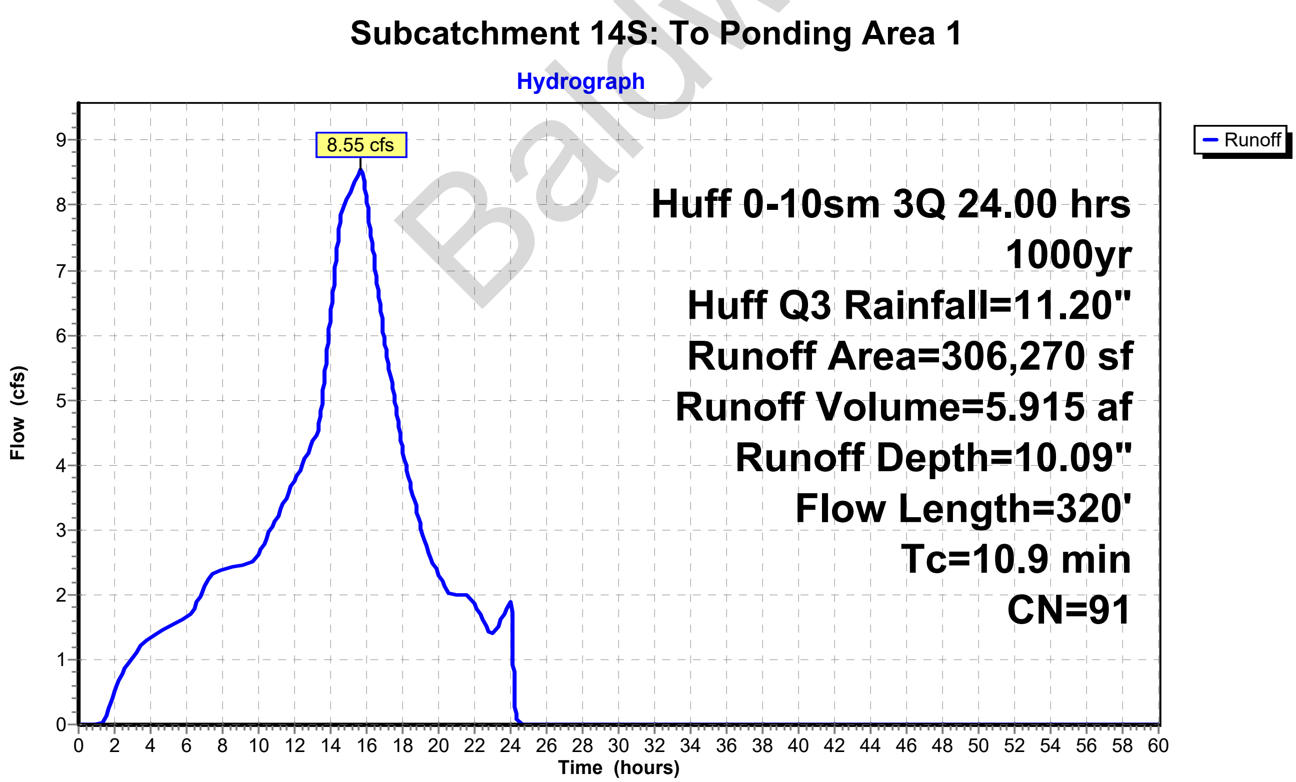
Summary for Subcatchment 14S: To Ponding Area 1

Runoff = 8.55 cfs @ 15.71 hrs, Volume= 5.915 af, Depth=10.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
246,462	89	<50% Grass cover, Poor, HSG D
59,808	98	Water Surface, HSG B
306,270	91	Weighted Average
246,462		80.47% Pervious Area
59,808		19.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0400	0.23		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.28"
3.6	220	0.0040	1.02		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
10.9	320	Total			



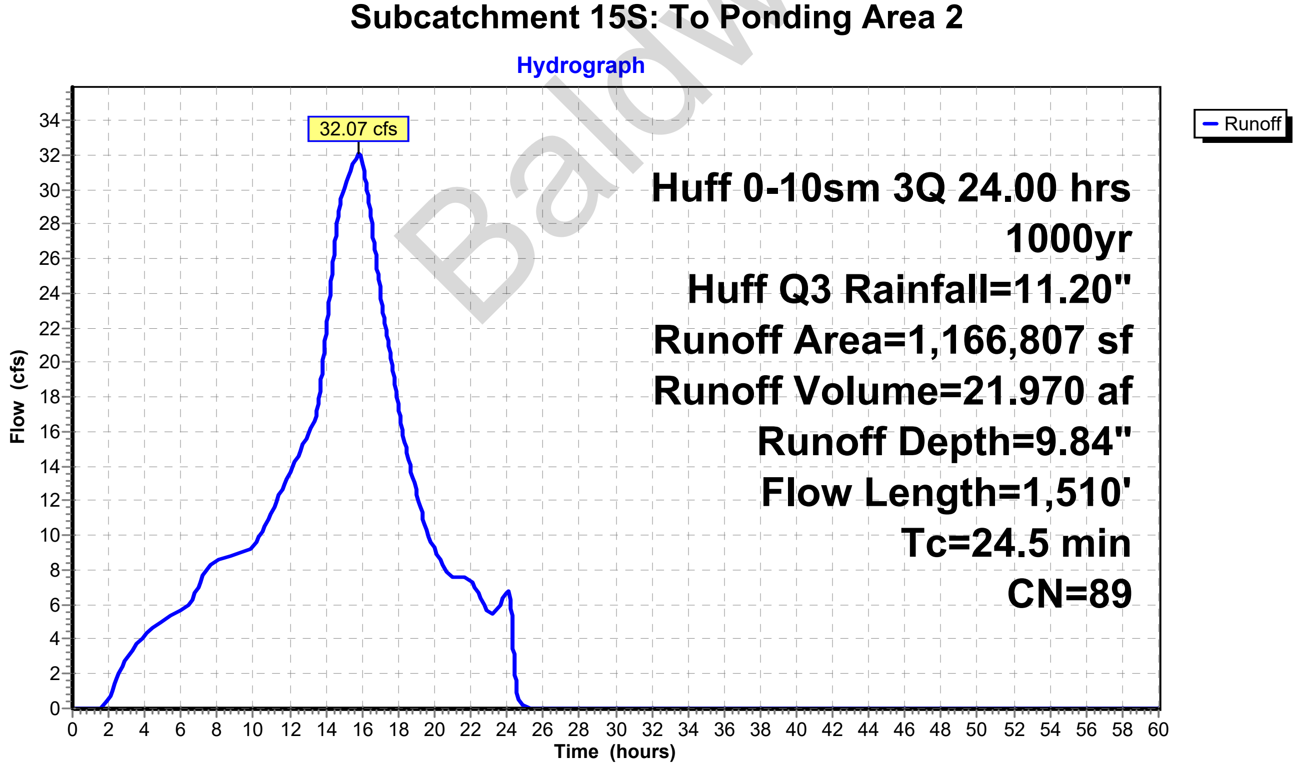
Summary for Subcatchment 15S: To Ponding Area 2

Runoff = 32.07 cfs @ 15.82 hrs, Volume= 21.970 af, Depth= 9.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
1,166,807	89	<50% Grass cover, Poor, HSG D
1,166,807		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	100	0.0600	0.64		**Sheet Flow, Sheet Flow** Fallow n= 0.050 P2= 3.28"
11.4	695	0.0040	1.02		**Shallow Concentrated Flow, Shallow Concentrated Flow, Pt 1** Unpaved Kv= 16.1 fps
10.5	715	0.0050	1.14		**Shallow Concentrated Flow, Shallow Concentrated Flow, Pt 2** Unpaved Kv= 16.1 fps
24.5	1,510	Total			



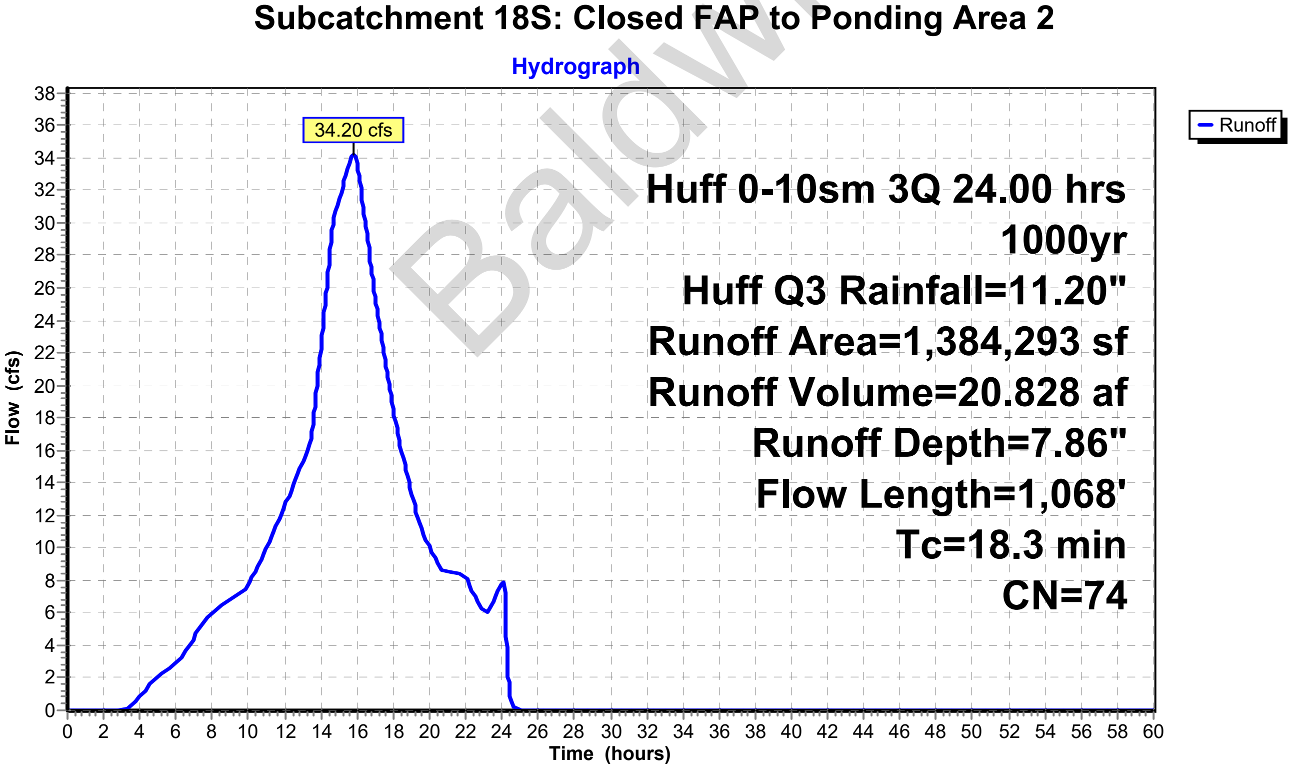
Summary for Subcatchment 18S: Closed FAP to Ponding Area 2

Runoff = 34.20 cfs @ 15.80 hrs, Volume= 20.828 af, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
1,384,293	74	>75% Grass cover, Good, HSG C
1,384,293		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.9	810	0.0130	0.80		**Shallow Concentrated Flow, Final Cover of Fly Ash Pond** Short Grass Pasture Kv= 7.0 fps
1.4	258	0.0100	3.13	131.45	**Trap/Vee/Rect Channel Flow, Ditch 24 (Type A)** Bot.W=5.00' D=3.00' Z= 3.0 '/' Top.W=23.00' n= 0.069 Riprap, 6-inch
18.3	1,068	Total			



Summary for Subcatchment 20S: Southeast Corner

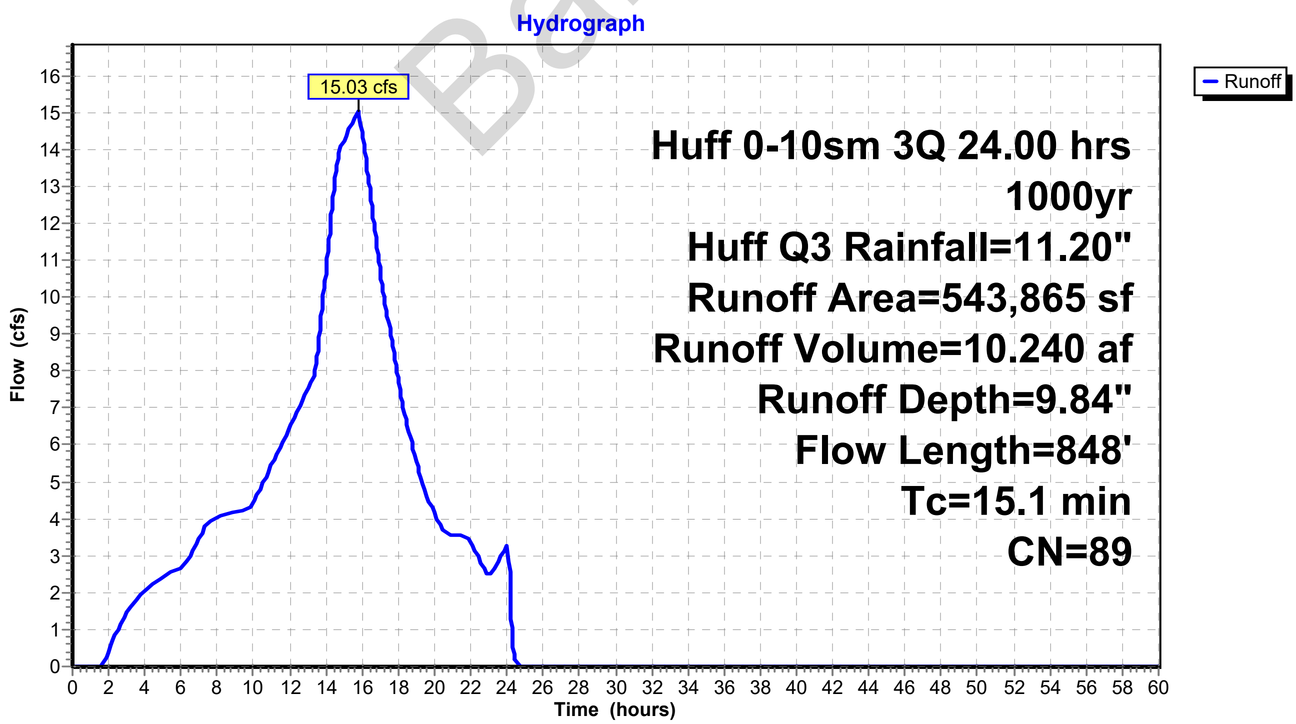
Runoff = 15.03 cfs @ 15.75 hrs, Volume= 10.240 af, Depth= 9.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
543,865	89	<50% Grass cover, Poor, HSG D
543,865		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.0340	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 3.28"
1.0	173	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	226	0.0400	3.22		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	62	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.4	287	0.0010	0.51		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.1	848	Total			

Subcatchment 20S: Southeast Corner



Summary for Subcatchment 21S: To Berm Pond Interior

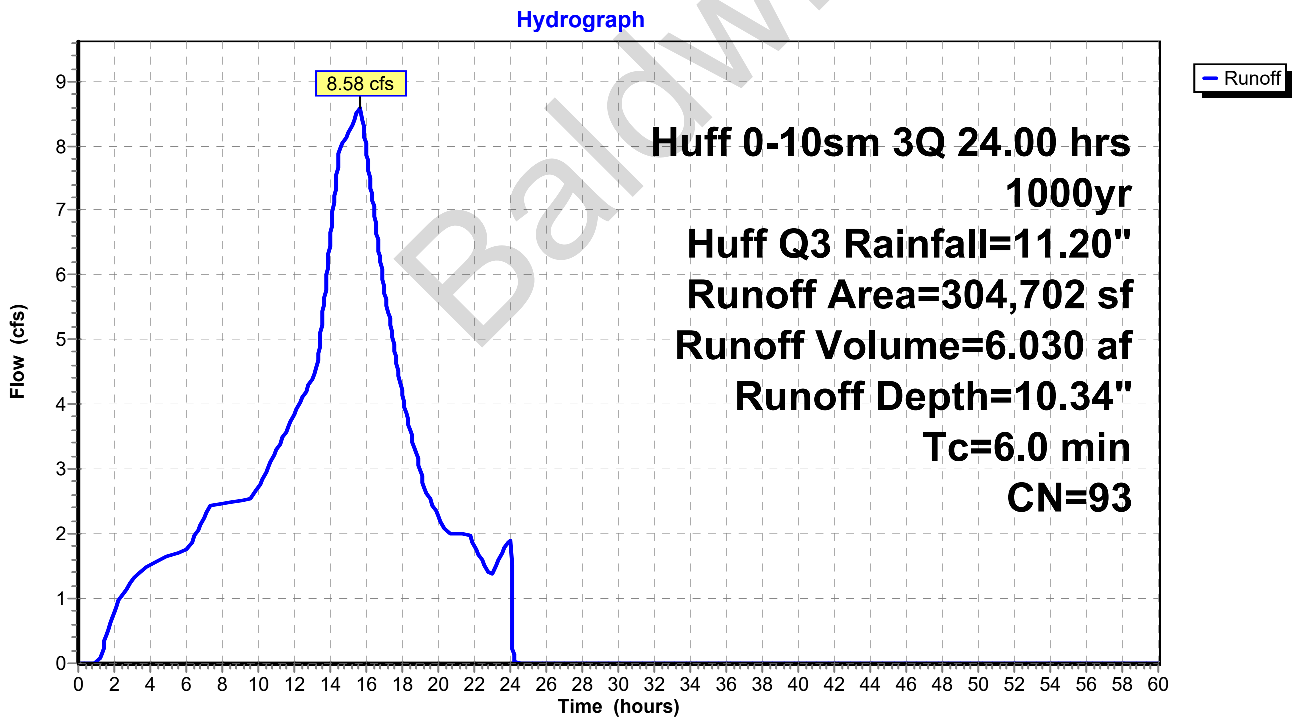
Runoff = 8.58 cfs @ 15.66 hrs, Volume= 6.030 af, Depth=10.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (sf)	CN	Description
43,429	98	Water Surface, HSG C
63,206	98	Water Surface, HSG C
198,067	91	Urban industrial, 72% imp, HSG C
304,702	93	Weighted Average
55,459		18.20% Pervious Area
249,243		81.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 21S: To Berm Pond Interior



Summary for Subcatchment 22S: To Secondary Pond

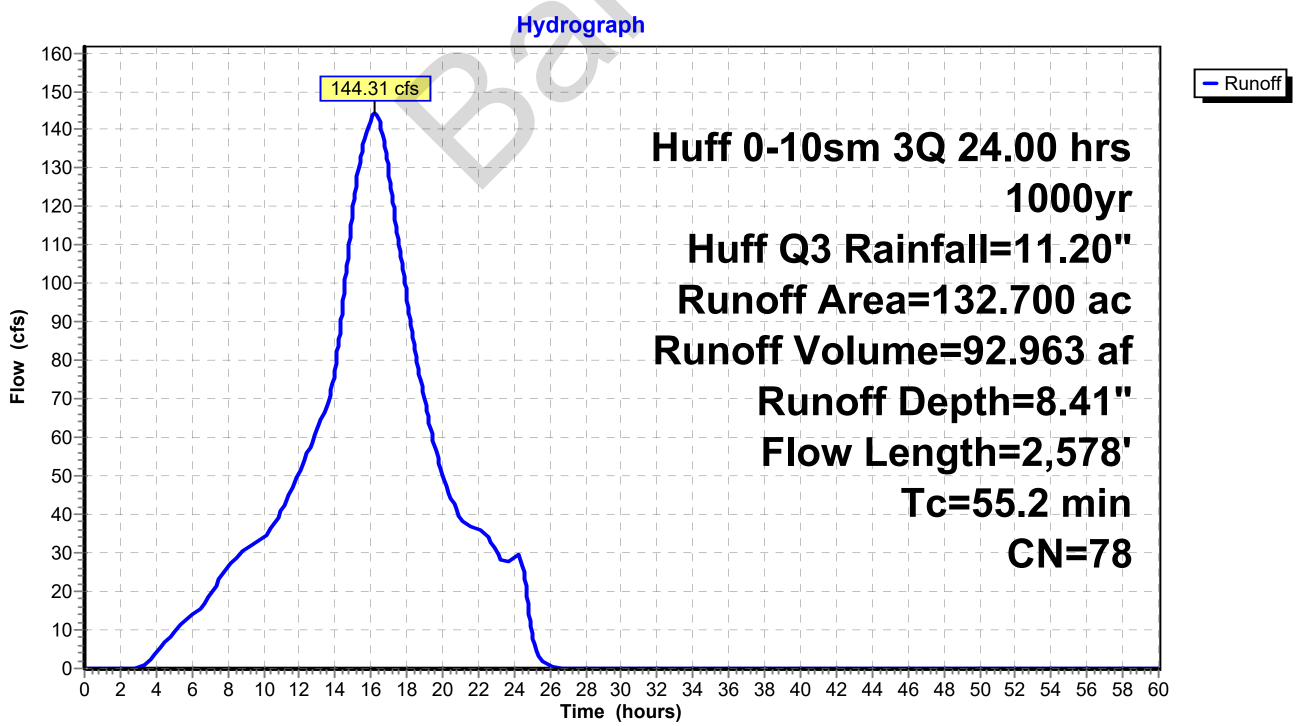
Runoff = 144.31 cfs @ 16.25 hrs, Volume= 92.963 af, Depth= 8.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr, Huff Q3 Rainfall=11.20"

Area (ac)	CN	Description
123.600	76	Woods/grass comb., Fair, HSG C
9.100	98	Water Surface, HSG B
132.700	78	Weighted Average
123.600		93.14% Pervious Area
9.100		6.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.2	100	0.0090	0.06		**Sheet Flow, Sheet Flow**
					Woods: Light underbrush n= 0.400 P2= 3.28"
14.7	418	0.0090	0.47		**Shallow Concentrated Flow, Shallow Concentrated Flow**
					Woodland Kv= 5.0 fps
11.3	2,060	0.0130	3.05	152.48	**Channel Flow, Channel Flow**
					Area= 50.0 sf Perim= 100.0' r= 0.50' n= 0.035
55.2	2,578	Total			

Subcatchment 22S: To Secondary Pond



Summary for Pond 1P: Tertiary Pond

Inflow Area = 459.069 ac, 7.53% Impervious, Inflow Depth > 8.88" for 1000yr, Huff Q3 event
Inflow = 456.41 cfs @ 16.90 hrs, Volume= 339.538 af
Outflow = 456.13 cfs @ 16.98 hrs, Volume= 337.590 af, Atten= 0%, Lag= 4.5 min
Primary = 30.33 cfs @ 16.98 hrs, Volume= 101.892 af
Secondary = 425.80 cfs @ 16.98 hrs, Volume= 235.698 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 396.64' @ 16.98 hrs Surf.Area= 2.963 ac Storage= 9.714 af

Plug-Flow detention time= 45.6 min calculated for 337.534 af (99% of inflow)
Center-of-Mass det. time= 33.0 min (1,416.7 - 1,383.7)

Volume	Invert	Avail.Storage	Storage Description
#1	393.00'	13.898 af	**Custom Stage Data (Irregular)** Listed below (Recalc)

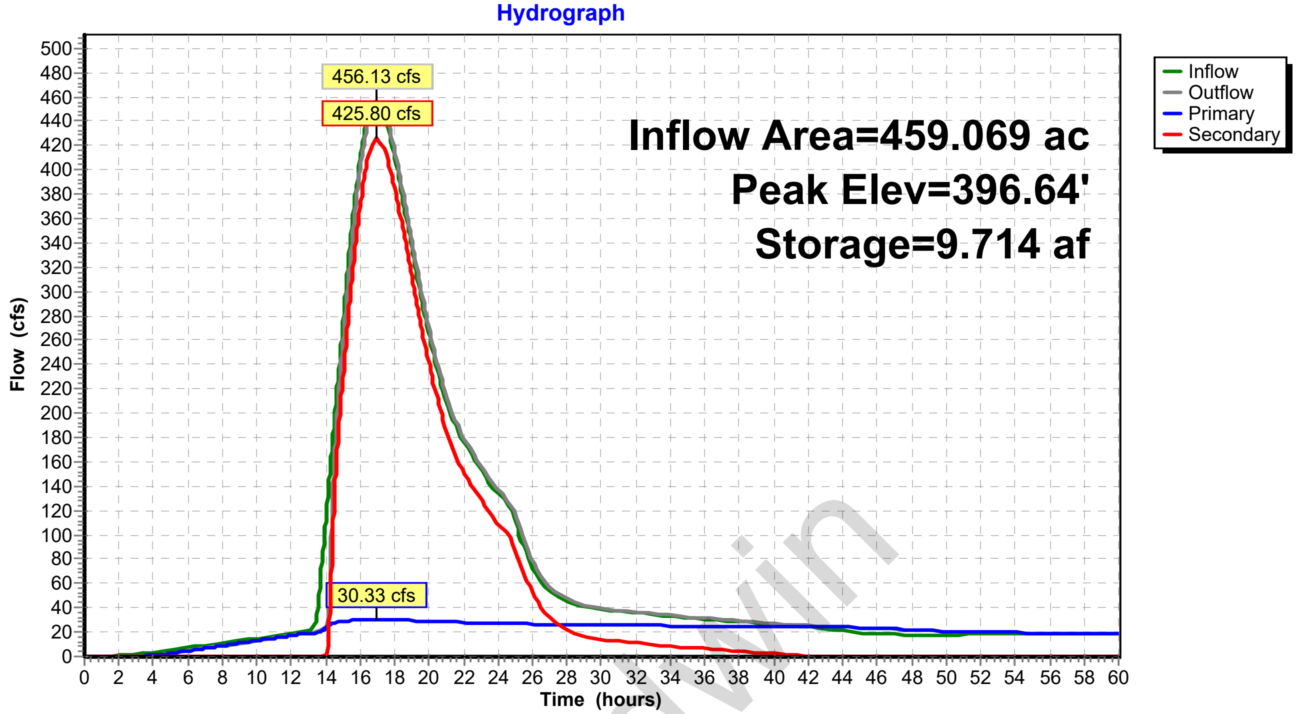
Elevation (feet)	Surf.Area (acres)	Perim. (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
393.00	2.400	1,324.0	0.000	0.000	2.400
394.00	2.500	1,382.0	2.450	2.450	2.688
395.00	2.700	1,434.0	2.599	5.049	2.958
396.00	2.900	1,507.0	2.799	7.849	3.352
397.00	3.000	1,574.0	2.950	10.798	3.730
398.00	3.200	1,656.0	3.099	13.898	4.216

Device	Routing	Invert	Outlet Devices
#1	Primary	371.00'	**30.0" Round CMP_Round 30"** L= 173.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 371.00' / 368.00' S= 0.0173 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 4.91 sf
#2	Device 1	393.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	395.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 2.00 Width (feet) 25.00 85.00 110.00

Primary OutFlow Max=30.33 cfs @ 16.98 hrs HW=396.64' TW=392.00' (Dynamic Tailwater)
└─**1=CMP_Round 30"** (Outlet Controls 30.33 cfs @ 6.18 fps)
  └─**2=Orifice/Grate** (Passes 30.33 cfs of 45.07 cfs potential flow)

Secondary OutFlow Max=425.80 cfs @ 16.98 hrs HW=396.64' TW=392.00' (Dynamic Tailwater)
└─**3=Custom Weir/Orifice** (Weir Controls 425.80 cfs @ 3.73 fps)

Pond 1P: Tertiary Pond



Summary for Pond 2P: Secondary Pond

Inflow Area = 453.448 ac, 7.12% Impervious, Inflow Depth > 10.42" for 1000yr, Huff Q3 event
Inflow = 469.47 cfs @ 16.38 hrs, Volume= 393.827 af
Outflow = 451.60 cfs @ 16.92 hrs, Volume= 335.229 af, Atten= 4%, Lag= 32.5 min
Primary = 18.95 cfs @ 13.54 hrs, Volume= 69.684 af
Secondary = 437.28 cfs @ 16.92 hrs, Volume= 265.545 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 398.60' @ 16.92 hrs Surf.Area= 20.912 ac Storage= 90.020 af

Plug-Flow detention time= 402.0 min calculated for 335.226 af (85% of inflow)
Center-of-Mass det. time= 188.8 min (1,390.1 - 1,201.3)

Volume	Invert	Avail.Storage	Storage Description
#1	393.00'	98.537 af	**Custom Stage Data (Irregular)** Listed below (Recalc)

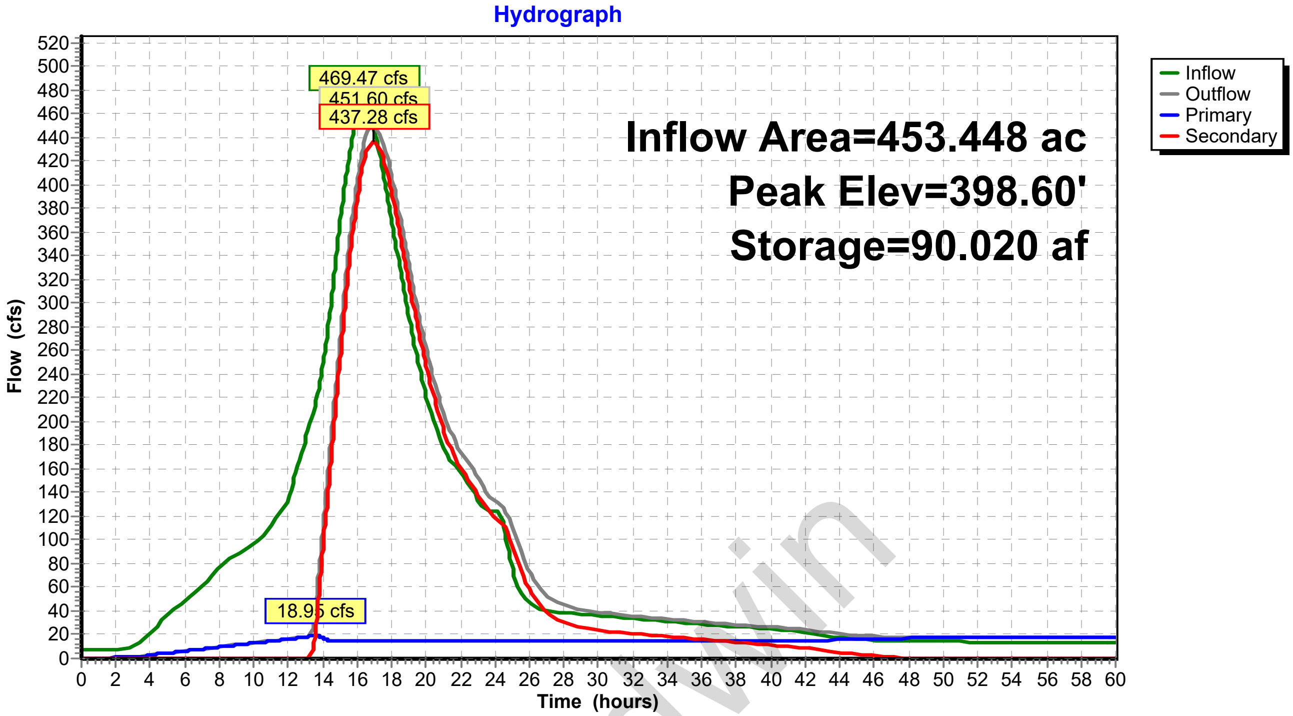
Elevation (feet)	Surf.Area (acres)	Perim. (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
393.00	11.300	4,513.0	0.000	0.000	11.300
394.00	12.700	4,633.0	11.993	11.993	13.308
395.00	14.700	4,945.0	13.688	25.681	18.768
396.00	16.500	5,123.0	15.591	41.272	22.044
397.00	18.400	5,686.0	17.441	58.714	33.162
398.00	19.800	5,802.0	19.096	77.809	35.600
399.00	21.670	7,345.0	20.728	98.537	72.659

Device	Routing	Invert	Outlet Devices
#1	Primary	380.00'	**30.0" Round CMP_Round 30"** L= 379.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 380.00' / 379.01' S= 0.0026 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 4.91 sf
#2	Device 1	393.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	397.20'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=18.95 cfs @ 13.54 hrs HW=397.38' TW=393.94' (Dynamic Tailwater)
└─**1=CMP_Round 30"** (Outlet Controls 18.95 cfs @ 3.86 fps)
  └─**2=Orifice/Grate** (Passes 18.95 cfs of 43.84 cfs potential flow)

Secondary OutFlow Max=437.28 cfs @ 16.92 hrs HW=398.60' TW=396.64' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 437.28 cfs @ 3.12 fps)

Pond 2P: Secondary Pond



Summary for Pond 3P: Bottom Ash Pond

Inflow Area = 205.645 ac, 11.27% Impervious, Inflow Depth > 13.19" for 1000yr, Huff Q3 event
Inflow = 233.87 cfs @ 16.00 hrs, Volume= 225.955 af, Incl. 7.24 cfs Base Flow
Outflow = 212.15 cfs @ 16.87 hrs, Volume= 224.137 af, Atten= 9%, Lag= 52.3 min
Primary = 49.20 cfs @ 16.87 hrs, Volume= 139.275 af
Secondary = 162.95 cfs @ 16.87 hrs, Volume= 84.862 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Starting Elev= 415.23' Surf.Area= 0.000 ac Storage= 3.442 af
Peak Elev= 419.13' @ 16.87 hrs Surf.Area= 0.000 ac Storage= 47.536 af (44.094 af above start)

Plug-Flow detention time= 277.7 min calculated for 220.692 af (98% of inflow)
Center-of-Mass det. time= 204.1 min (1,392.6 - 1,188.5)

Volume	Invert	Avail.Storage	Storage Description
#1	414.80'	60.270 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
414.80	0.000
415.00	1.620
416.00	9.540
417.00	20.040
418.00	31.830
419.00	45.580
420.00	60.270

Device	Routing	Invert	Outlet Devices (Turned on 2 times)
#1	Primary	410.00'	**30.0" Round Culvert** L= 500.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 410.00' / 399.16' S= 0.0217 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	414.80'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	417.40'	**Pump X 0.00** Discharges@430.00' Turns Off<417.20' 12.0" Diam. x 1,000.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 1,000.0 2,000.0 3,000.0 4,000.0 5,000.0 6,000.0 7,000.0 Head (feet)= 51.00 45.00 35.00 31.00 30.00 28.00 21.00 14.00 -Loss (feet)= 0.00 2.54 9.15 19.40 33.04 49.95 70.01 93.14 =Lift (feet)= 51.00 42.46 25.85 11.60 -3.04 -21.95 -49.01 -79.14
#4	Tertiary	417.60'	**Pump X 0.00** Discharges@430.00' Turns Off<417.20' 12.0" Diam. x 1,000.0' Long Discharge, Hazen-Williams C= 130 Flow (gpm)= 0.0 1,000.0 2,000.0 3,000.0 4,000.0 5,000.0 6,000.0 7,000.0 Head (feet)= 51.00 45.00 35.00 31.00 30.00 28.00 21.00 14.00

-Loss (feet)= 0.00 2.54 9.15 19.40 33.04 49.95 70.01 93.14
=Lift (feet)= 51.00 42.46 25.85 11.60 -3.04 -21.95 -49.01
-79.14

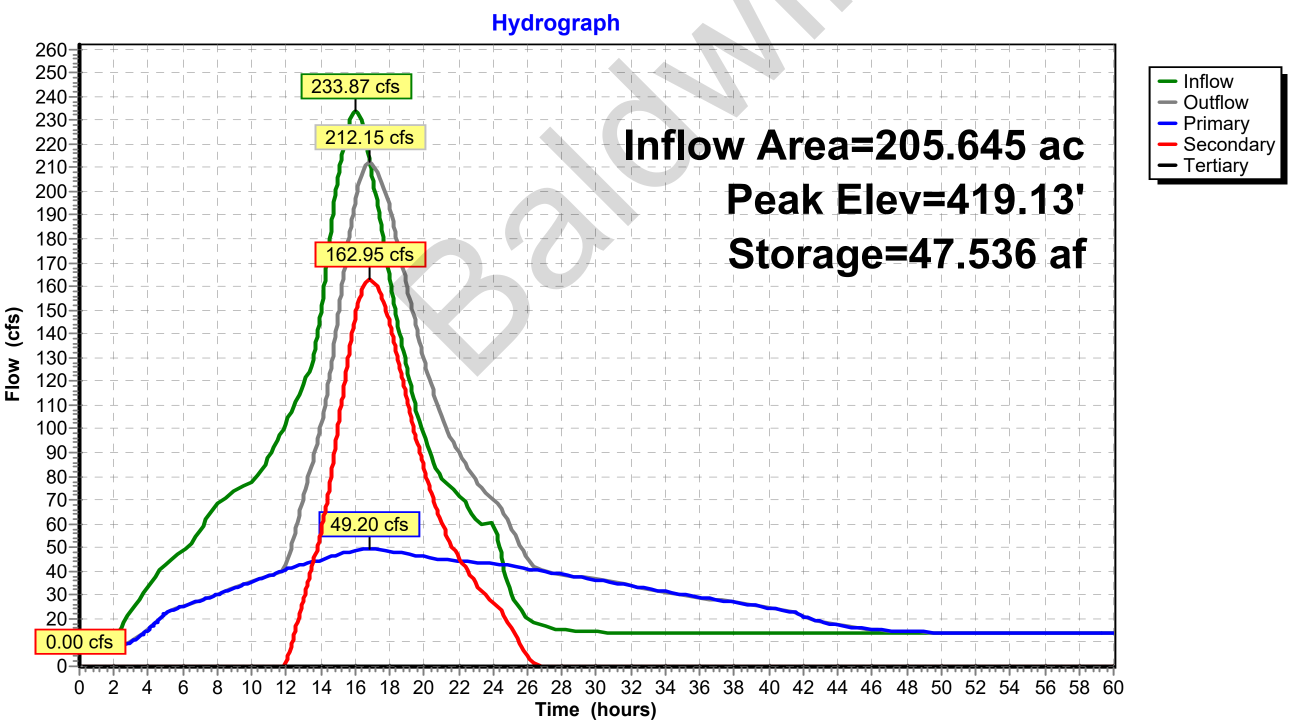
#5	Secondary	417.70'	**36.0' long x 52.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=49.20 cfs @ 16.87 hrs HW=419.13' TW=398.60' (Dynamic Tailwater)
└**1=Culvert** (Passes 49.20 cfs of 52.39 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 49.20 cfs @ 10.02 fps)

Secondary OutFlow Max=162.95 cfs @ 16.87 hrs HW=419.13' TW=398.60' (Dynamic Tailwater)
└**5=Broad-Crested Rectangular Weir** (Weir Controls 162.95 cfs @ 3.16 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=415.23' (Free Discharge)
├**3=Pump** (Controls 0.00 cfs)
└**4=Pump** (Controls 0.00 cfs)

Pond 3P: Bottom Ash Pond



Summary for Pond 6P: Middle Bottom Ash Pond

Inflow Area = 51.833 ac, 14.88% Impervious, Inflow Depth = 9.97" for 1000yr, Huff Q3 event
Inflow = 61.76 cfs @ 15.97 hrs, Volume= 43.059 af
Outflow = 58.61 cfs @ 16.44 hrs, Volume= 43.290 af, Atten= 5%, Lag= 27.9 min
Primary = 58.61 cfs @ 16.44 hrs, Volume= 43.290 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Starting Elev= 426.03' Surf.Area= 0.000 ac Storage= 0.242 af
Peak Elev= 426.57' @ 16.44 hrs Surf.Area= 0.000 ac Storage= 4.616 af (4.375 af above start)

Plug-Flow detention time= 77.7 min calculated for 43.041 af (100% of inflow)
Center-of-Mass det. time= 73.2 min (954.6 - 881.3)

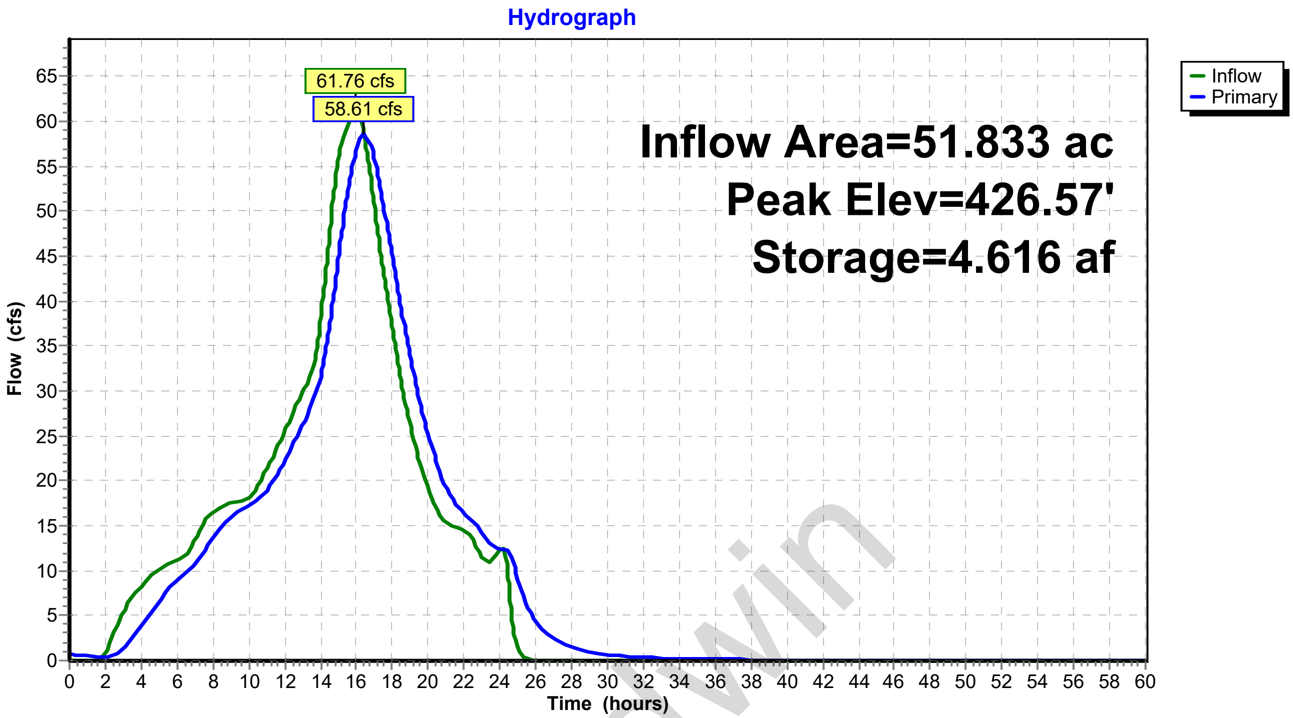
Volume	Invert	Avail.Storage	Storage Description
#1	426.00'	39.957 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
426.00	0.000
427.00	8.051
428.00	16.784
429.00	28.039
430.00	39.957

Device	Routing	Invert	Outlet Devices
#1	Primary	426.00'	**50.0' long x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=58.61 cfs @ 16.44 hrs HW=426.57' TW=419.11' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 58.61 cfs @ 2.04 fps)

Pond 6P: Middle Bottom Ash Pond



Summary for Pond 8P: Ponding Area 1

Inflow Area = 106.819 ac, 7.26% Impervious, Inflow Depth > 12.12" for 1000yr, Huff Q3 event
Inflow = 114.91 cfs @ 16.00 hrs, Volume= 107.921 af
Outflow = 114.74 cfs @ 16.10 hrs, Volume= 107.712 af, Atten= 0%, Lag= 5.7 min
Primary = 114.74 cfs @ 16.10 hrs, Volume= 107.712 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 426.91' @ 16.10 hrs Surf.Area= 0.000 ac Storage= 1.384 af

Plug-Flow detention time= 13.5 min calculated for 107.712 af (100% of inflow)
Center-of-Mass det. time= 8.8 min (1,197.1 - 1,188.3)

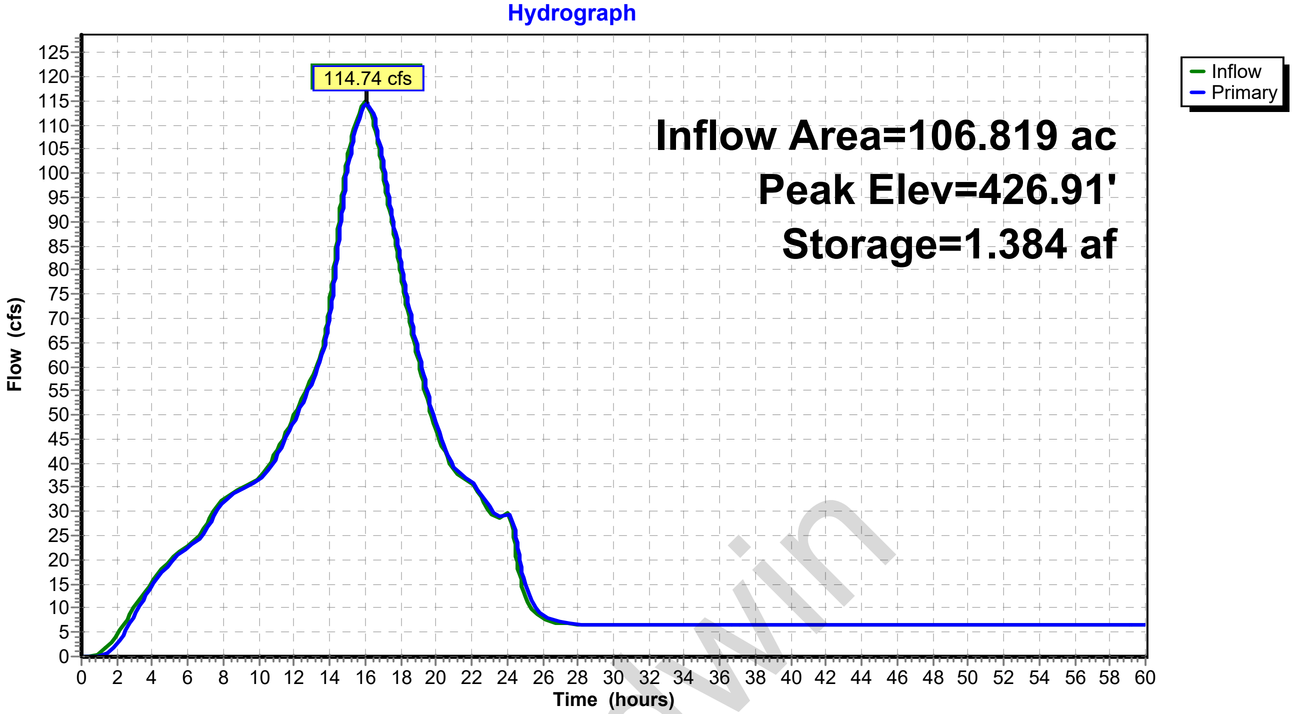
Volume	Invert	Avail.Storage	Storage Description
#1	426.00'	14.132 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
426.00	0.000
427.00	1.529
428.00	3.605
429.00	8.731
430.00	14.132

Device	Routing	Invert	Outlet Devices
#1	Primary	426.00'	**50.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=114.74 cfs @ 16.10 hrs HW=426.91' TW=419.06' (Dynamic Tailwater)
└—**1=Broad-Crested Rectangular Weir** (Weir Controls 114.74 cfs @ 2.54 fps)

Pond 8P: Ponding Area 1



Summary for Pond 9P: Ponding Area 2

Inflow Area = 99.788 ac, 6.40% Impervious, Inflow Depth > 12.31" for 1000yr, Huff Q3 event
Inflow = 108.03 cfs @ 15.88 hrs, Volume= 102.366 af
Outflow = 106.88 cfs @ 16.06 hrs, Volume= 102.007 af, Atten= 1%, Lag= 10.9 min
Primary = 106.88 cfs @ 16.06 hrs, Volume= 102.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 433.01' @ 16.06 hrs Surf.Area= 0.000 ac Storage= 2.369 af

Plug-Flow detention time= 24.1 min calculated for 101.990 af (100% of inflow)
Center-of-Mass det. time= 15.7 min (1,207.9 - 1,192.2)

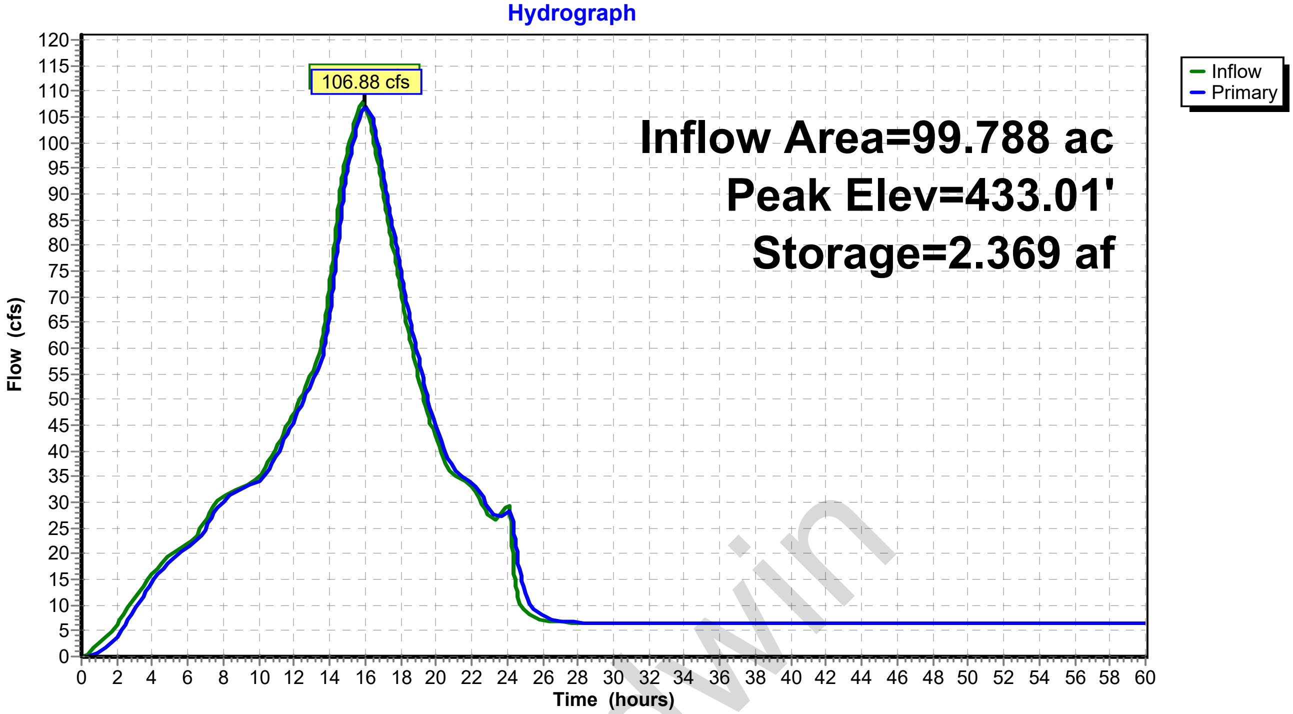
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	15.090 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
432.00	0.000
433.00	2.330
434.00	6.050
435.00	15.090

Device	Routing	Invert	Outlet Devices
#1	Primary	432.00'	**40.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=106.88 cfs @ 16.06 hrs HW=433.01' TW=426.91' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 106.88 cfs @ 2.64 fps)

Pond 9P: Ponding Area 2



Summary for Pond 11P: Berm Pond - Exterior

From client email dated 26 August 2021:

Each pump is 3000gpm, Unit 1 and Unit 2 each have 2 pumps.

Normal/daily operation for pulling ash is 1 pump running for each unit. Ops has two 12 hour shifts that cover.
Bottom ash is pulled 1/shift for each unit so a total of 4 times for ~ 90 minutes each time
Econ ash is pulled 3/shift for each unit so a total of 12 times for ~ 45-60 minutes each time
SCR ash is pulled 3/shift for each unit so a total of 12 times for ~ 45-60 minutes each time

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[92] Warning: Device #2 is above defined storage

Inflow Area = 41.223 ac, 15.48% Impervious, Inflow Depth > 17.56" for 1000yr, Huff Q3 event
Inflow = 47.78 cfs @ 15.66 hrs, Volume= 60.310 af, Incl. 6.50 cfs Base Flow
Outflow = 42.51 cfs @ 16.27 hrs, Volume= 59.568 af, Atten= 11%, Lag= 36.8 min
Primary = 42.51 cfs @ 16.27 hrs, Volume= 59.568 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 443.99' @ 16.27 hrs Surf.Area= 0.000 ac Storage= 3.937 af

Plug-Flow detention time= 69.5 min calculated for 59.566 af (99% of inflow)
Center-of-Mass det. time= 42.0 min (1,403.4 - 1,361.4)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	3.960 af	**Custom Stage Data** Listed below

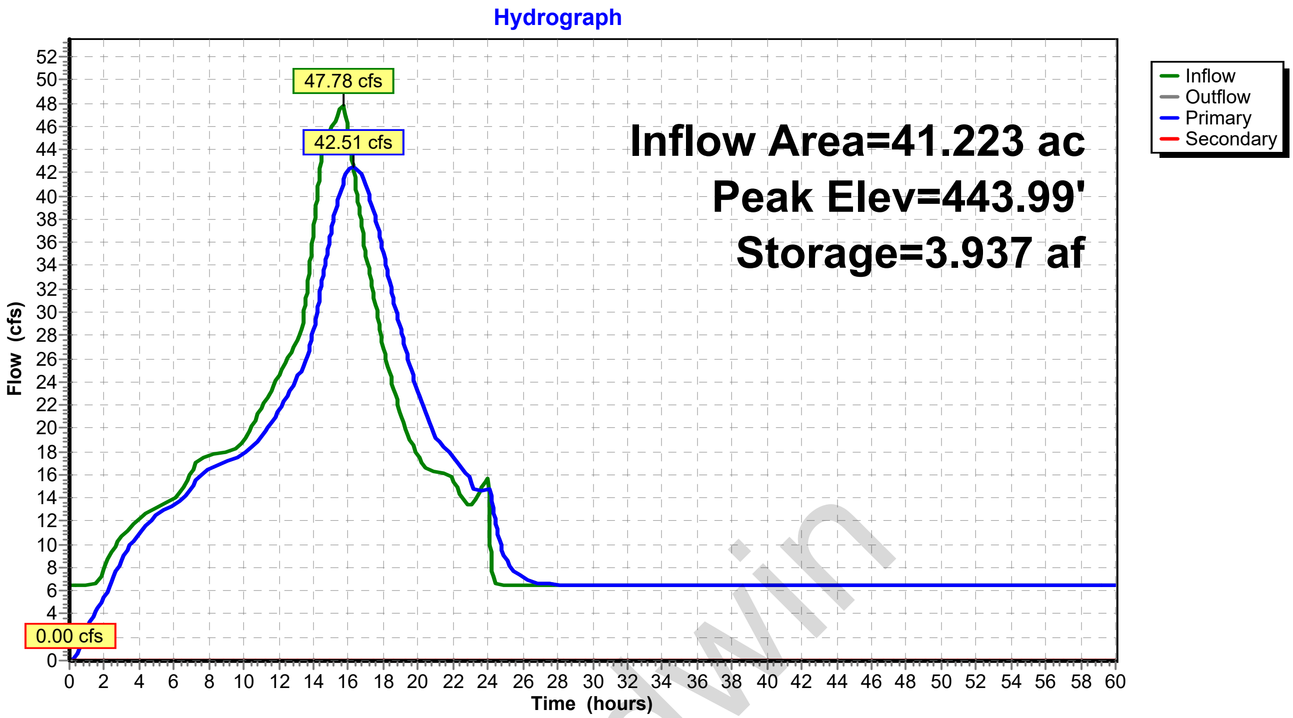
Elevation (feet)	Cum.Store (acre-feet)
442.00	0.000
443.00	1.252
444.00	3.960

Device	Routing	Invert	Outlet Devices
#1	Primary	442.00'	**21.0" Round Culvert X 3.00** L= 40.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 442.00' / 441.50' S= 0.0125 '/' Cc= 0.900 n= 0.011, Flow Area= 2.41 sf
#2	Secondary	444.00'	**25.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=42.52 cfs @ 16.27 hrs HW=443.99' TW=433.01' (Dynamic Tailwater)
1=Culvert (Barrel Controls 42.52 cfs @ 6.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=442.00' TW=432.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 11P: Berm Pond - Exterior



Summary for Pond 19P: Culvert from Closed FAP

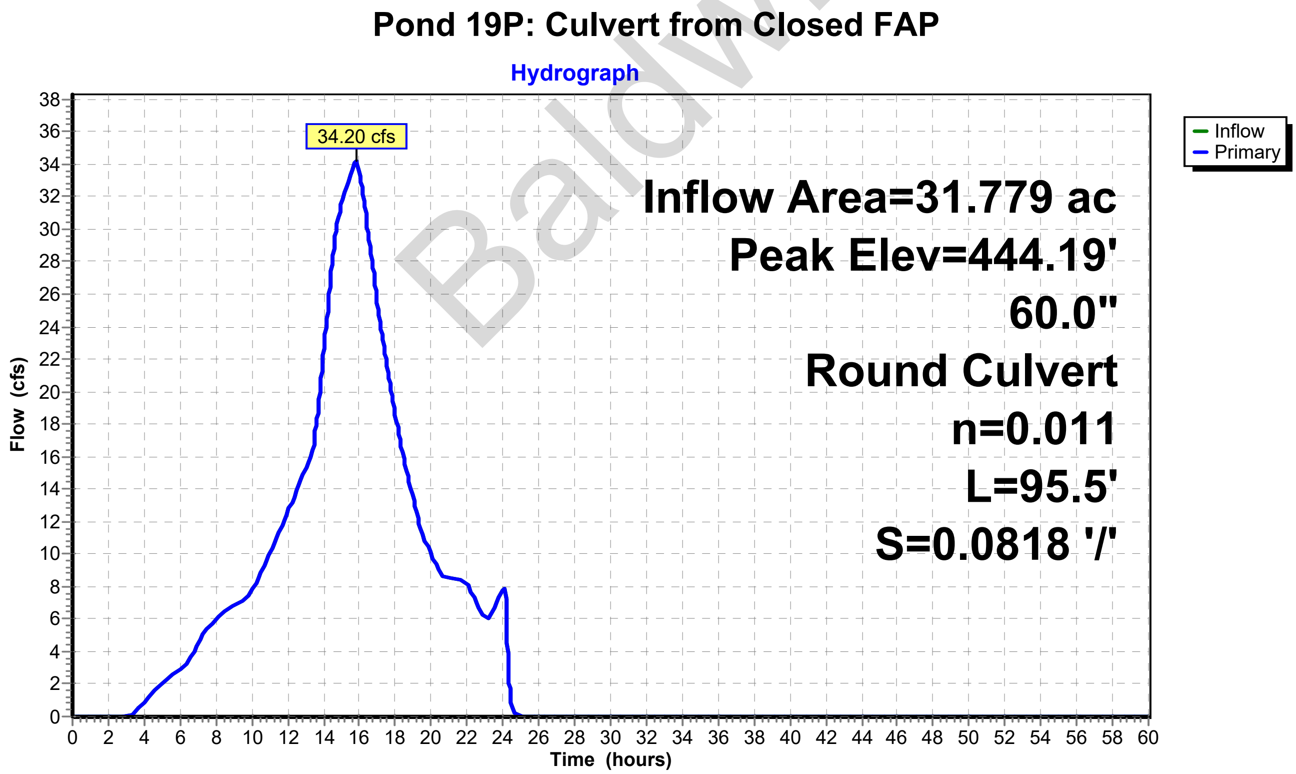
[57] Hint: Peaked at 444.19' (Flood elevation advised)

Inflow Area =	31.779 ac,	0.00% Impervious, Inflow Depth =	7.86"	for 1000yr, Huff Q3 event
Inflow =	34.20 cfs @	15.80 hrs, Volume=	20.828 af	
Outflow =	34.20 cfs @	15.80 hrs, Volume=	20.828 af,	Atten= 0%, Lag= 0.0 min
Primary =	34.20 cfs @	15.80 hrs, Volume=	20.828 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 444.19' @ 15.80 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	442.22'	**60.0" Round Culvert** L= 95.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 442.22' / 434.41' S= 0.0818 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 19.63 sf

Primary OutFlow Max=34.20 cfs @ 15.80 hrs HW=444.19' TW=433.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 34.20 cfs @ 4.77 fps)



Summary for Pond 20P: Berm Pond - Interior

[92] Warning: Device #1 is above defined storage

Inflow Area =	6.995 ac, 81.80% Impervious, Inflow Depth = 10.34"		for 1000yr, Huff Q3 event
Inflow =	8.58 cfs @ 15.66 hrs, Volume=	6.030 af	
Outflow =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af, Atten= 100%, Lag= 0.0 min	
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 451.17' @ 24.34 hrs Surf.Area= 0.000 ac Storage= 6.030 af

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

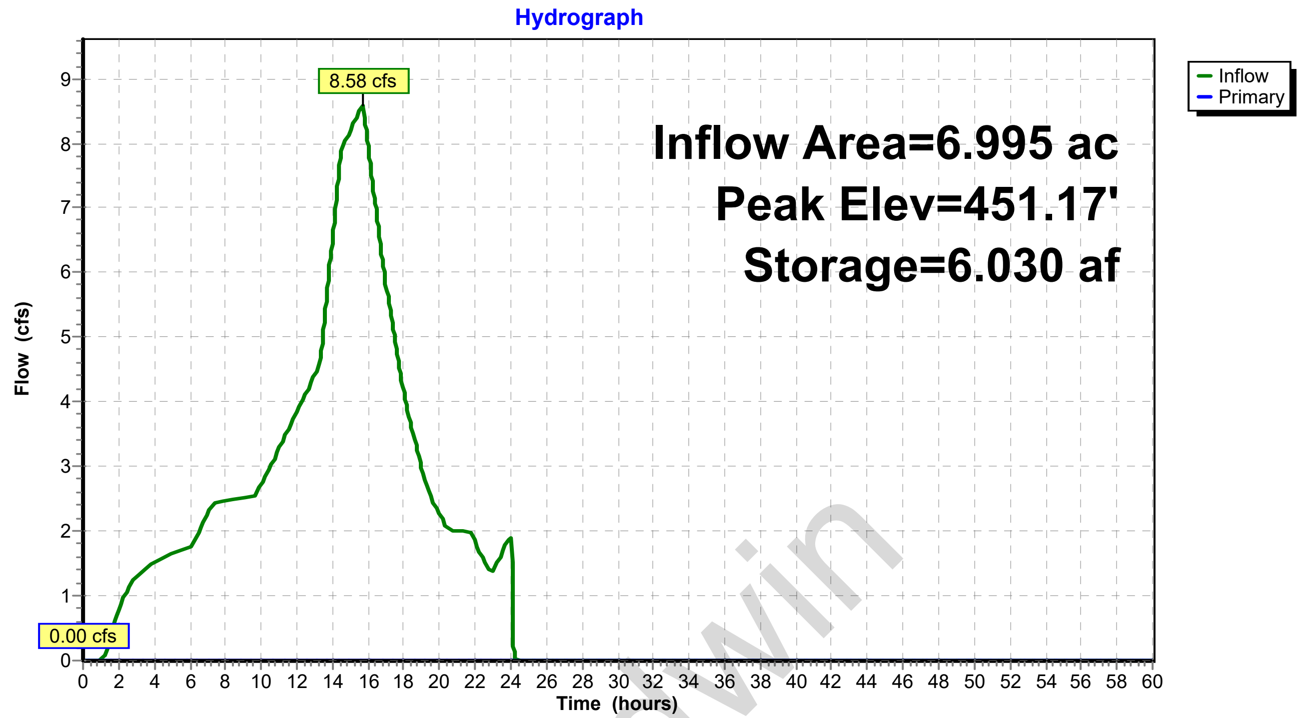
Volume	Invert	Avail.Storage	Storage Description
#1	448.00'	8.852 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
448.00	0.000
449.00	1.144
450.00	2.364
451.00	5.466
452.00	8.852

Device	Routing	Invert	Outlet Devices
#1	Primary	452.00'	**250.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=448.00' TW=442.00' (Dynamic Tailwater)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 20P: Berm Pond - Interior



Summary for Link 21L: Kaskaskia River (100-yr Flood Elev.)

Inflow Area =	459.069 ac,	7.53% Impervious,	Inflow Depth > 8.82"	for 1000yr, Huff Q3 event
Inflow =	456.13 cfs @	16.98 hrs,	Volume= 337.590 af	
Primary =	456.13 cfs @	16.98 hrs,	Volume= 337.590 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Fixed water surface Elevation= 392.00'