ALLIANT ENERGY
Interstate Power and Light Company
Burlington Generating Station

CCR SURFACE IMPOUNDMENT

INFLOW DESIGN FLOOD CONTROL PLAN

Report Issued: August 25, 2016
Revision 0

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EXECUTIVE SUMMARY

This Inflow Flood Control Plan (Report) is prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual from Electric Utilities (40 CFR Parts 257 and 261, also known as the CCR Rule) published on April 17, 2015 and effective October 19, 2015.

This Report assesses the hydrologic and hydraulic capacity requirements for each CCR unit at Burlington Generating Station in Burlington, Iowa in accordance with §257.82 of the CCR Rule. For purposes of this Report, a CCR unit is defined as any existing CCR surface impoundment. Primarily, the Report documents how the inflow design flood control system has been designed and constructed to meet the CCR Rule section §257.82.

Table of Contents

Figures

Appendices

1 Introduction

The owner or operator of the Coal Combustion Residual (CCR) unit must conduct an initial and periodic inflow design flood control system plan to determine if each CCR unit adequately manages flow into and from each CCR unit during and following the peak discharge of the inflow design flood. The inflow design flood is selected based on the hazard potential classification (§257.73(a)(2)) for each CCR unit.

The Report has been prepared in accordance with the requirements of §257.82 of the CCR Rule.

1.1 CCR Rule Applicability

The CCR Rule requires an initial and periodic inflow design flood control system plan certified by a qualified professional engineer (PE) for all existing CCR surface impoundments. This report is the initial inflow design flood control system plan.

1.2 Hydrologic and Hydraulic Capacity Applicability

The Burlington Generating Station (BGS) in Burlington, Iowa (Figure 1) has four existing CCR surface impoundments that meet the requirements of §257.73(b)(1) or §257.73(b)(2) of the CCR Rule, which are identified as follows:

- BGS Ash Seal Pond
- BGS Main Ash Pond
- BGS Economizer Pond
- BGS Upper Ash Pond

2 FACILITY DESCRIPTION

The following sub-section provides a summary description of the facility and existing CCR surface impoundments located at BGS.

BGS is located southeast of the City of Burlington, Iowa on the western shore of the Mississippi River in Des Moines County, at 4282 Sullivan Slough Road, Burlington, Iowa (Figure 1). BGS is a fossil-fueled electric generating station consisting of one steam electric generating unit and four combustion turbine units. Sub-bituminous coal is the primary fuel for producing steam, with the ability to use natural gas for the combustion turbines. The burning of coal produces a by-product of CCR. The CCR at BGS is categorized into three types: bottom ash, economizer ash, and precipitator fly ash.

General Facility Information:

Date of Initial Facility Operations:	1968
NPDES Permit Number:	IA29-00-1-01
Facility Title V Operating Permit:	98-TV-023R1-M004
Latitude / Longitude:	40°44'29"N 91°07'04"W
Site Coordinates:	Section 29, Township 69 North, Range 02 West
Unit Nameplate Ratings:	Unit 1: 212 MW

2.1 BGS Ash Seal Pond

The BGS Ash Seal Pond is located south of the generating plant and east of the BGS Main Ash Pond. The CCR, in 1968, was originally managed by discharging into the BGS Ash Seal Pond for settling. Presently, the BGS Ash Seal Pond only receives storm water runoff from the surrounding area associated with the fly ash storage silo. The BGS Ash Seal Pond also may receive facility process water, such as ash seal water, but only if there is an issue with the ash seal water pumps. At the time of the initial annual inspection on October 26, 2015 this CCR surface impoundment did not contain standing water.

The surface area of the BGS Ash Seal Pond is approximately 5.7 acres and has an embankment height of approximately 12 feet from the crest to the toe of the downstream slope. The embankment crest is at elevation 534 the same as the adjacent plant site grade and equivalent to the 100 year flood water elevation of the Mississippi River. The interior storage depth of the BGS Ash Seal Pond is approximately 12 feet. If water were present, the total volume of impounded CCR and water within the BGS Ash Seal Pond would be approximately 97,000 cubic yards, which would include general fill that has been added in the northeast corner of the impoundment. The original outfall for the impoundment is sealed to prevent discharge to the Mississippi River and the impoundment normally contains no water. Rainfall that accumulates exfiltrates through the bottom of the impoundment. A manually operated pump is available to lift storm water to the adjacent BGS Main Ash Pond, if necessary.

2.2 BGS Main Ash Pond

The BGS Main Ash Pond is located southwest of the generating plant and west of the BGS Ash Seal Pond. The CCR, prior to being sluiced to the BGS Main Ash Pond, was originally managed in the BGS Ash Seal Pond in 1968. In 1971, BGS managed CCR in the BGS Upper Ash Pond. In 1980, the BGS Main Ash Pond became the primary receiver of CCR, with the BGS Upper Ash Pond becoming a downstream receiver.

Presently, the BGS Main Ash Pond receives bottom ash that is sluiced from the generating plant to the northeast corner of the BGS Main Ash Pond. The sluiced bottom ash discharges into the northeast corner where the majority of the bottom ash settles out. The bottom ash that settles out is recovered for beneficial reuse. Hydrated fly ash is also stored within the BGS Main Ash Pond area prior to being sold as aggregate material for beneficial reuse. Fly ash from the on-site storage silo is no longer added to the embankment.

The water that is used to sluice the bottom ash into the BGS Main Ash Pond is routed towards the west end of the BGS Main Ash Pond. The water is discharged in batch

quantities as bottom ash accumulates in the boiler and averages 1 cubic foot per second (cfs) on a daily basis. The water flows to the west along the north side of a road constructed out of bottom ash through the center of the BGS Main Ash Pond, Figure 2. The water flows along the north side of the road until it reaches the west end where it transitions into a ponded area in the northwest corner of the BGS Main Ash Pond. The water in the northwest corner of the BGS Main Ash Pond flows through two 15-inch diameter corrugated metal culverts with identical invert elevation under the generating plant entrance road. The water discharges into a small channel in the southwest corner of the BGS Upper Ash Pond located north of the generating plant entrance road.

The surface area of the BGS Main Ash Pond is approximately 18.7 acres and has an embankment height of approximately 12 feet from the crest to the toe of the downstream slope. The embankment crest is at elevation 534 the same as the plant site grade and equivalent to the 100 year flood water elevation in the Mississippi River. The interior storage depth of the BGS Main Ash Pond is approximately 8 feet. The total volume of impounded CCR and water within the BGS Main Ash Pond at normal water operation elevation is approximately 240,000 cubic yards. Additional volume of impounded CCR, located in the eastern half of the BGS Main Ash Pond above the crest elevation of the embankment, includes the bottom ash storage area and C-stone embankment (hydrated fly ash). In 2008, the quantity of the additional CCR above the crest elevation of the embankment is approximately 104,000 cubic yards.

2.3 BGS Economizer Pond

The BGS Economizer Pond is located west of the generating plant and north of the BGS Main Ash Pond. In 1986, BGS constructed the BGS Economizer Pond in the southern and eastern portion of the original footprint of the BGS Upper Ash Pond. The impoundment has resulted from economizer ash that has been deposited since 1986, which created the economizer embankment which is higher than the embankments of the BGS Upper Ash Pond at approximately elevation 548.

Presently, the BGS Economizer Pond receives economizer ash. The economizer ash is sluiced from the generating plant to the east end of the BGS Economizer Pond via a 10-inch diameter polyvinyl chloride pipe at a flow rate of 1.5 cfs (including approximately 10% plant process water). The economizer ash settles out through the water column of the 0.4 acre BGS Economizer Pond while the water flows to the west. The water discharges from the BGS Economizer Pond through an 18-inch diameter high-density polyethylene pipe into a storm water and process water treatment channel located along the south side of the economizer embankment.

The storm water and process water treatment channel receives runoff from 8 acres surrounding the generating plant. The collected storm water drains into a pump vault located at the toe of the downstream slope of the east embankment of the BGS Economizer Pond. Plant process water flows through an oil/water separator and receives influent flows from the plant floor drains and water treatment process water. After the oil/water separator, the process water discharges into the pump vault. The storm water and process water is then pumped from the vault up to the storm water treatment channel. The storm water treatment channel flows to the west along the south side of the economizer embankment until it discharges through an 18-inch diameter high-density polyethylene pipe located in the southwest corner of the economizer embankment. The water from the storm water treatment channel discharges into a small channel in the southwest corner of the BGS Upper Ash Pond located north of the generating plant entrance road.

The total surface area of the BGS Economizer Pond and economizer embankment is approximately 11 acres and has an embankment height of approximately 13 feet from the crest to the toe of slope on the CCR in the BGS Upper Ash Pond. The interior storage depth of the top of the economizer embankment to the bottom of the original footprint of the BGS Upper Ash Pond is approximately 27 feet. Thus, the total volume of impounded CCR and water within the BGS Economizer Pond including CCR already in place when the impoundment was established is approximately 480,000 cubic yards.

2.4 BGS Upper Ash Pond

The BGS Upper Ash Pond is located northwest of the generating plant and north of the BGS Main Ash Pond. In 1971, BGS began managing CCR in the BGS Upper Ash Pond. In 1980, the BGS Main Ash Pond became the primary receiver of CCR and the BGS Upper Ash Pond became a downstream receiver of the BGS Main Ash Pond.

Presently, the BGS Upper Ash Pond receives influent flows from the BGS Main Ash Pond, BGS Economizer Pond, and storm water and process water flow from the generating plant. The influent flows all discharge into a small channel located in the southwest corner of the BGS Upper Ash Pond. The water in the channel routed along the south side of the gravel dike of the BGS Upper Ash Pond until it discharges into the southwest corner of the BGS Upper Ash Pond water body.

The water flows through the BGS Upper Ash Pond water body to the northeast towards a 24-inch wide precast concrete Parshall flume that discharges into a concrete catch basin. The water in the catch basin flows through a 15-inch diameter polyvinyl chloride pipe and discharges into the BGS Lower Pond. Instrumentation associated with the BGS Upper Ash Pond includes a flow meter that monitors the discharges. The discharge from the concrete catch basin enters the Lower Pond. The Lower Pond contains the facility's National Pollution Discharge Elimination System (NPDES) Outfall 001. The water flows through the NPDES Outfall 001 hydraulic structure, which consists of cast in place weir box.

The total surface area of the BGS Upper Ash Pond is approximately 13.3 acres and has an embankment height of approximately 10 feet from the crest to the toe of the downstream slope. The elevation of the embankments is 531 feet, 3 feet lower than the 100 year flood elevation of the Mississippi River. The embankment is armored with cobble size stone on the crest and both outer and inner embankment slopes to prevent erosion of the

embankment during overtopping from extreme flood stage of the Mississippi River. The interior storage depth of the BGS Upper Ash Pond is approximately 7 feet. The volume of impounded CCR and water within the BGS Upper Ash Pond at normal operation water elevation is approximately 150,000 cubic yards.

3 HYDROLOGIC AND HYDRAULIC CAPACITY- §257.82(a)

This Report provides hydrologic and hydraulic capacity information for inflow design flood control systems which is intended to:

1. Adequately manage flow into each CCR unit during and following the peak discharge inflow of the specified design flood,
2. Adequately manage flow from each CCR unit during and following the peak discharge inflow of the specified design flood; and,
3. Handle discharge from the CCR unit in accordance with National Pollutant Discharge Elimination System (NPDES) regulations §257.3-3.

3.1 Hazard Classification and Design Storm

Based on the 2016 Hazard Potential Classification analysis conducted by HHS, both the BGS Ash Seal Pond and BGS Main Ash Pond were classified as significant hazard potential due to the risk that pond contents could enter into the BGS Generating Station condenser discharge channel and from there into the Mississippi River. Based on the 2016 Hazard Potential Classification analysis conducted by HHS, both the BGS Economizer Pond and BGS Upper Ash Pond are classified as low hazard potential because if a release occurs, the contents would likely remain on BGS plant property.

The design storm for the BGS Ash Seal Pond and BGS Main Seal Pond is the 1,000 year return event SCS Type II 24 hour storm as designated in §257.82(a)(3)(ii). The design storm for the BGS Economizer Pond and the BGS Upper Ash Pond is the 100 year return event SCS Type II 24 hour storm as designated in §257.82(a)(3)(iii). The total rainfall for the two design events selected from the National Oceanographic and Atmospheric Administration's (NOAA) probabilistic map for the BGS Site coordinates is 10.3 inches for the 1,000 year event and 7.3 inches for the 100 year event, Appendix B.

Since surface water from the BGS Main Ash Pond must route through the BGS Upper Ash Pond, the Inflow Flood will be the 1,000 year event for the complete storm water system.

3.2 Hydrologic and Hydraulic Capacity Methods

3.2.1 BGS Ash Seal Pond

The 1,000 year SCS Type II storm of 10.3 inches accumulates in the storage pool of the BGS Ash Seal Pond without outflow. The total volume of the water is calculated by accumulating the rainfall on the watershed of 7.7 acres and storing the water in the BGS ash seal pond reservoir without discharge. The water elevation in the pond at the end of the design flood event is compared to the crest elevation of the embankment to determine the freeboard remaining at the end of the storm.

3.2.2 Storm Routing Through BGS Economizer Pond, BGS Main Ash Pond, and BGS Upper Ash Pond

The 1,000 year SCS Type 2 Storm was routed through the CCR units. The flow path is illustrated on Figure 2. The routing was completed using the program Hydraflow by Intelisolve[1]. Hydraflow uses the unit hydrograph method to generate a Type II distributed rainfall distribution for each of the drainage area subsets in the watershed. Hydraflow then routes the unit hydrographs through the outlet structures of each BGS pond, storing water within the pond in accordance with the input reservoir capacity of the pond. The proportion of runoff to rainfall for each subunit of the drainage watershed is input based on the characteristics of the area.

The subareas of the flood control plan are shown in Figure 1 and include:

1. Storm water runoff from 8 acres of the plant site that is collected at the base of the BGS Economizer Pond at elevation 534 feet and pumped to the top of the BGS Economizer Pond at elevation 548 feet. Due to pump capacity, the flow is limited to a peak of 17.8 cubic feet per second (cfs).

2. Storm water runoff from 17 acres of the BGS Main Ash Pond.

[1]Intelisolve. Pond Routing Software Hydraflow, 2002

3. Storm water runoff from 25 acres of the BGS Economizer Pond and BGS Upper Ash Pond combined.

4. In addition to the storm water flows identified above, a BGS process water flow of 1.0 cfs is added to the BGS Main Ash Pond and 1.5 cfs is added to the plant site water flow discharged to the BGS Economizer Pond, Appendix A.

3.3 Hydrologic and Hydraulic Capacity Input and Assumptions

This section identifies the input and assumptions for the hydrologic and hydraulic capacity calculations. The input for each drainage subarea is:

Sub-Area	Acreage	Curve Number (CN)	Slope (%)	Hydraulic Length (ft)
Plant Site	8	90	1.0	600
Main Ash Pond	17	85	1.5	1,250
Economizer Ditch	Open channel	Mannings n = 0.009	0	1,000
Economizer and Upper Ash Ponds	25	87	1.5	1,250

The CN for the plant site is typical of industrial sites with considerable paved areas. The CN for the ash pond areas reflects the ability to infiltrate into unsaturated CCR which is exposed and available to store infiltrated water early in the storm distribution.

Three reservoirs are part of the flood routing system and consist of the BGS Main Ash Pond, the BGS Economizer Ditch and Pond, and the BGS Upper Ash Pond. The outlet structures for each pond and the maximum storage capacity of the pond at maximum flow are:

Pond Reservoir	Total Storage (acre-feet)	Outlet Structure	Invert Elevation (feet)	Secondary Outlet Structure	Invert Elevation (feet)
BGS Main Ash Pond	11.0	2 – 15 inch CMP culverts	531.1	none	
BGS Economizer Pond	0.21	1 – 18 inch HDPE	544.0	1 – 12 inch steel	545.6

BGS Upper Ash Pond	51.8	Monitoring Flume + 15 inch PVC pipe	527.4	1 – 14 inch pipe with manual operated gate valve	529.0

The details of the BGS Economizer Pond and BGS Upper Ash Pond outfall structures are shown in Appendix C. There are no available design drawings for the BGS Main Ash Pond outfall which is shown in the pictures contained in Appendix C.

The assumptions which impact the analysis of the flood routing are:

1. The outfall structures are not submerged on the tailwater and are therefore inlet restricted. This is a realistic assumption for the BGS Main Ash Pond and the BGS Economizer Pond. For the BGS Upper Ash Pond with the outlet invert of 523.4 feet, the tail could be submerged if the Mississippi River is in flood stage above approximately 525 feet. This is a reasonable assumption since Mississippi River flood stage and design flood are unlikely to be coincident.
2. The emergency overflow pipe on the BGS Upper Ash Pond has a manually operated valve. It is assumed that this valve is closed and all of the flood flow must past through the flume and 15-inch diameter discharge pipe.
3. The rainfall runoff on the Plant Area (Figure 2) is stored on the plant area when the pump capacity of the lift pumps is exceeded and the volume is recovered as the pumps catch-up after the precipitation event. This volume could overflow directly to the BGS Upper Ash Pond reducing the duration of the maximum pumping capacity event.
4. To be conservative, no exfiltration of water through the bottom of the ponds is considered in the analysis. Since the natural soil under the ponds is clay the assumption likely holds for all ponds except for the Economizer Pond where a substantial unsaturated zone is available to accept exfiltrate water during the rainfall event.

5. The beginning water elevation condition in the ponds at the start of the inflow flood is the normal operating elevations, or in the case of the Ash Seal Pond, no water.

4 Inflow Design Flood Control System Plan

The inflow flood caused by a 1,000 year return event SCS Type II storm distribution is routed through the CCR pond system at BGS. The routing includes the BGS Ash Seal Pond that operates as a no discharge pond and the remaining ash ponds that discharge through NPDES outfall 001.

4.1 BGS Ash Seal Pond Plan

The 7.7 acres of the ash seal pond will accumulate 6.6 acre-feet of water during the design storm. Without discharging water, the final water elevation in the pond will be 533.4 feet with a freeboard of 0.6 feet. The results of the calculation of capacity are presented in Appendix D.

The area of the BGS Ash Seal pond is located on the natural levee deposits of the Mississippi River and unlike the other ash ponds located west of the levee, Figure 1, has a sandy natural soil under the pond. The actual water elevation in the pond is likely to be lower due to exfiltration of water during the storm event.

4.2 BGS Ash Ponds Draining to BGS Upper Ash Pond Outfall

The 50 acres of general plant area, BGS Main Ash Pond, BGS Economizer Pond, and BGS Upper Ash Pond will discharge a maximum flow of 9.4 cfs at the Upper Ash Pond outfall during the inflow flood routing. Between the Main Ash pond and the Upper Ash Pond, 36.5 acre feet of water will be stored above the normal operating elevation of the two ponds at maximum discharge. The storage will occur with a water elevation of 533.4 feet in the BGS Main Ash Pond (freeboard 0.6 foot) and 530.3 feet in the BGS Upper Ash Pond (freeboard 0.7 feet). The hydrographs, reservoir and outlet details are presented in Appendix E.

The flow from the BGS Economizer Pond includes the storm water from the plant area and the process water flow of 1.5 cfs. Based on both 4,000 gpm pumps in the combined storm water and process water sump operating, the maximum flow to the ditch on top of

the BGS Economizer Pond is 19.3 cfs. This flow will occur for approximately 1 hour during the peak of the inflow flood event and will cause the capacity of both outfall pipes from the BGS Economizer Pond to be exceeded. The excess flow will overtop the embankment of the BGS Economizer Pond at the outfall location where it will run down the face of the slope to the BGS Upper Ash Pond. The event with a duration of approximately 1-hour will likely result in erosion of the embankment with the CCR and/or embankment clay deposited into the BGS Upper Ash Pond. The erosion will likely not result in release from the facility property.

5 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

To meet the requirements of 40 CFR 257.82(c)(5), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Iowa; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.82.

By: _____

Name: MARK LOEROP

Date: 8-25-2016

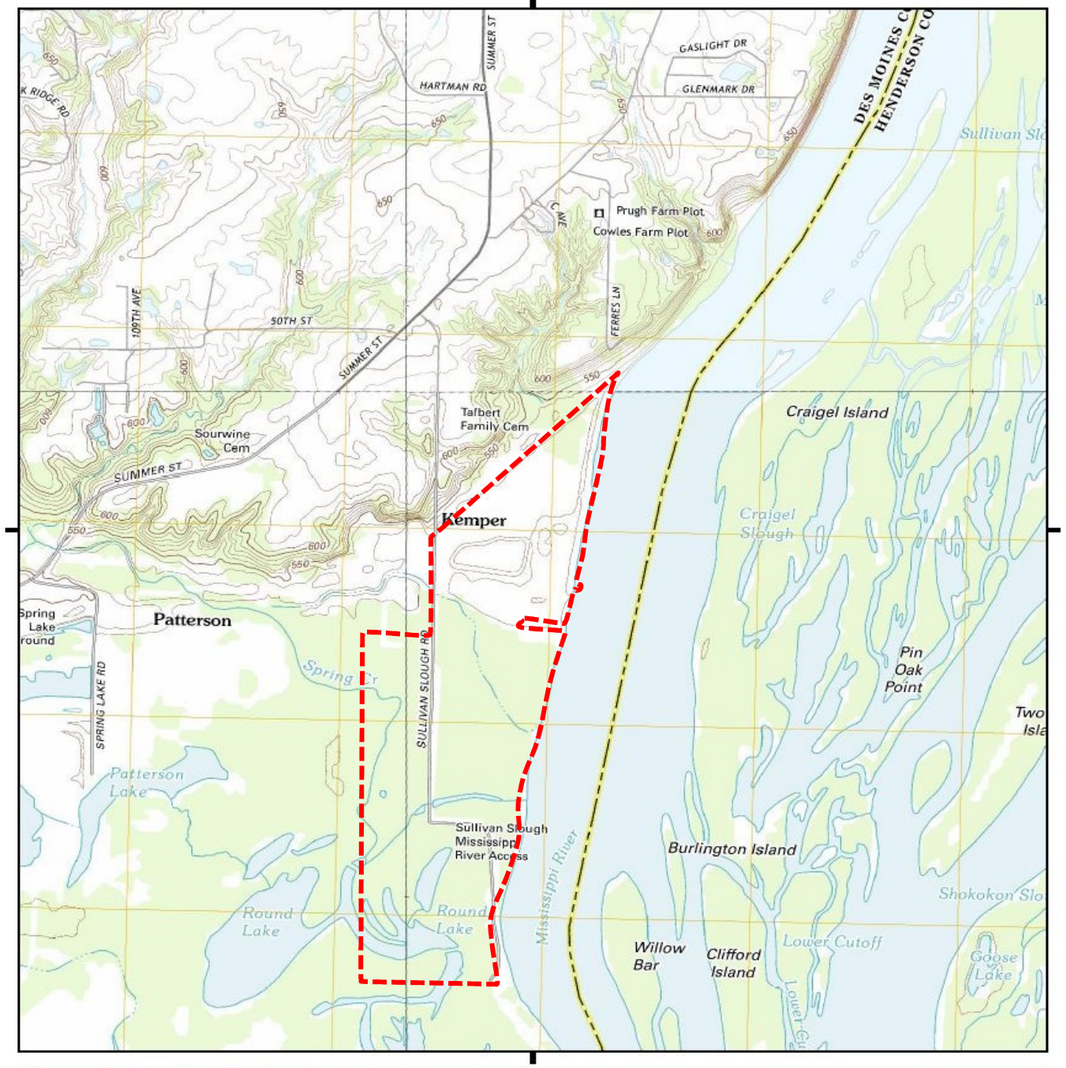
FIGURES

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Inflow Design Flood Control System Plan

Historical Topo Map

2012, 2013



Miles 0.25 0.5 1 1.5

This report includes information from the following map sheet(s).

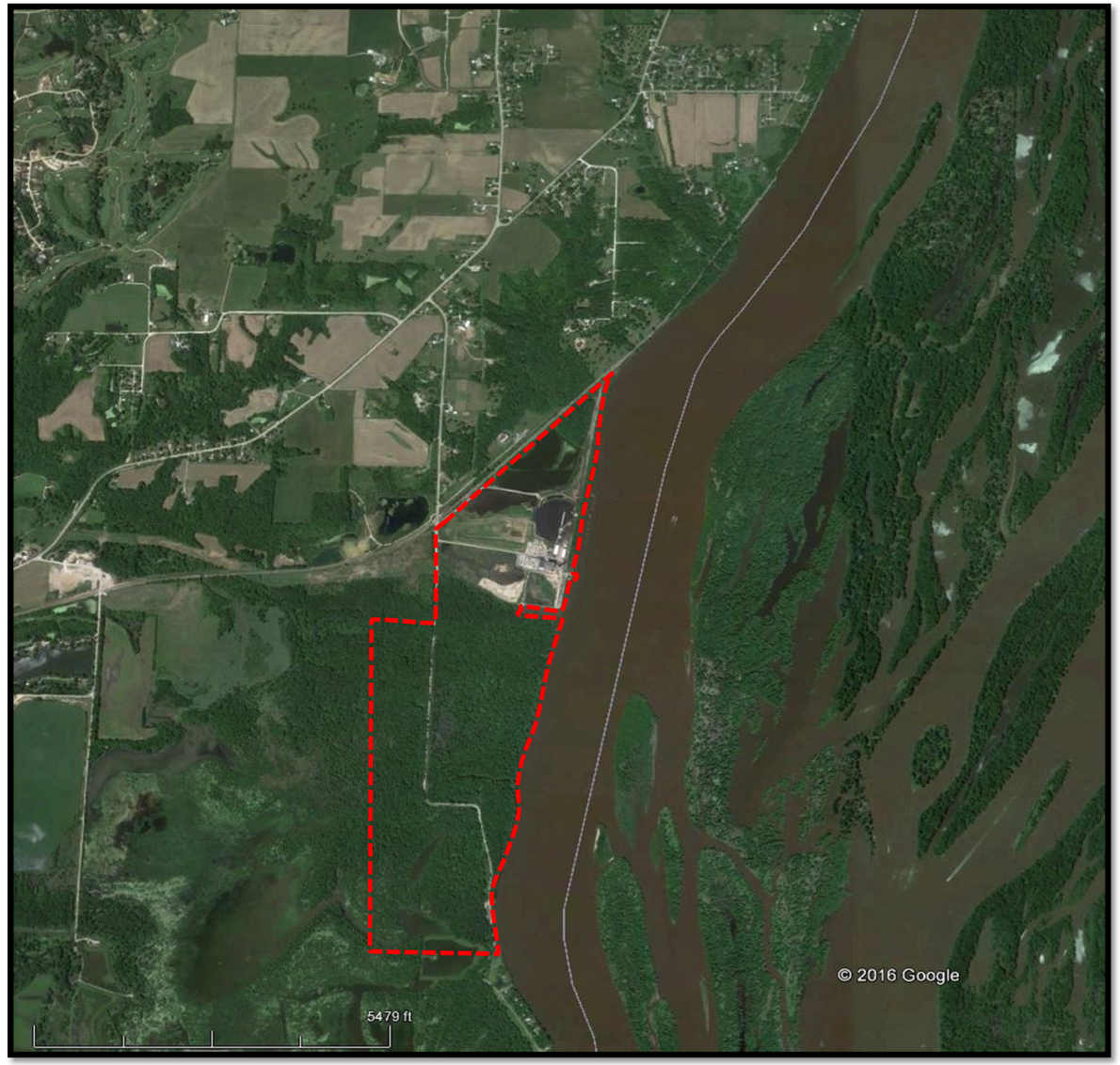
NW N NE
W E
SW S SE

TP, Lomax, 2012, 7.5-minute
NE, Burlington, 2013, 7.5-minute
SW, Dallas City, 2012, 7.5-minute
NW, West Burlington, 2013, 7.5-minute

SITE NAME: Burlington Generating Station
ADDRESS: 4282 Sullivan Slough Road
Burlington, IA 52601
CLIENT: Environmental Site Assessors

4555570 - 3 page 4

Historical Aerial Photo 6/12/2014



Approximate Property Boundary

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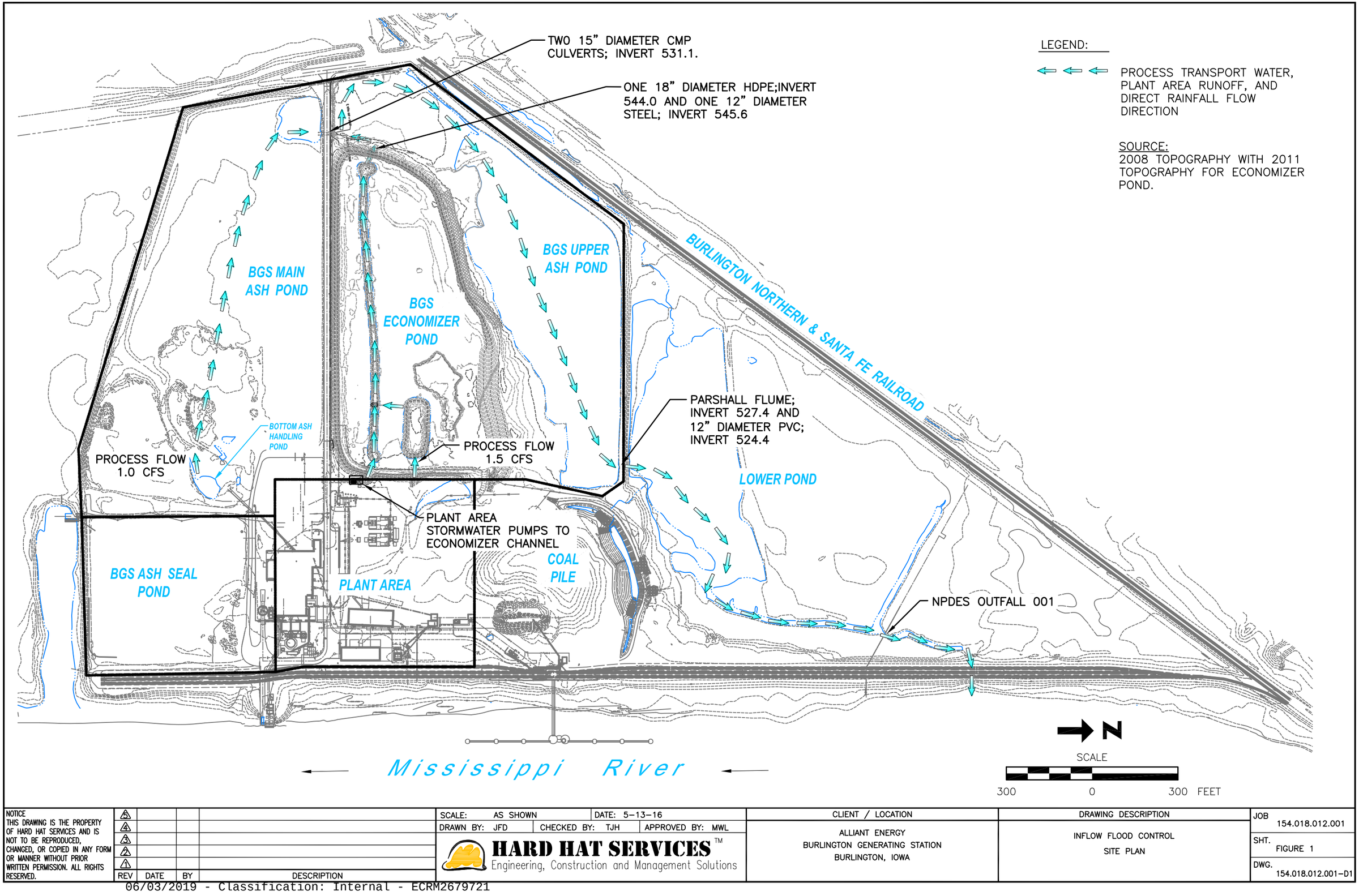
Site Location
Burlington Generating Station
Intersate Power and Light Company

Drawing
Figure 1

Date
5/25/2016



LEGEND:

PROCESS TRANSPORT WATER, PLANT AREA RUNOFF, AND DIRECT RAINFALL FLOW DIRECTION

SOURCE:
2008 TOPOGRAPHY WITH 2011 TOPOGRAPHY FOR ECONOMIZER POND.

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

SCALE: AS SHOWN | DATE: 5-13-16
DRAWN BY: JFD | CHECKED BY: TJH | APPROVED BY: MWL

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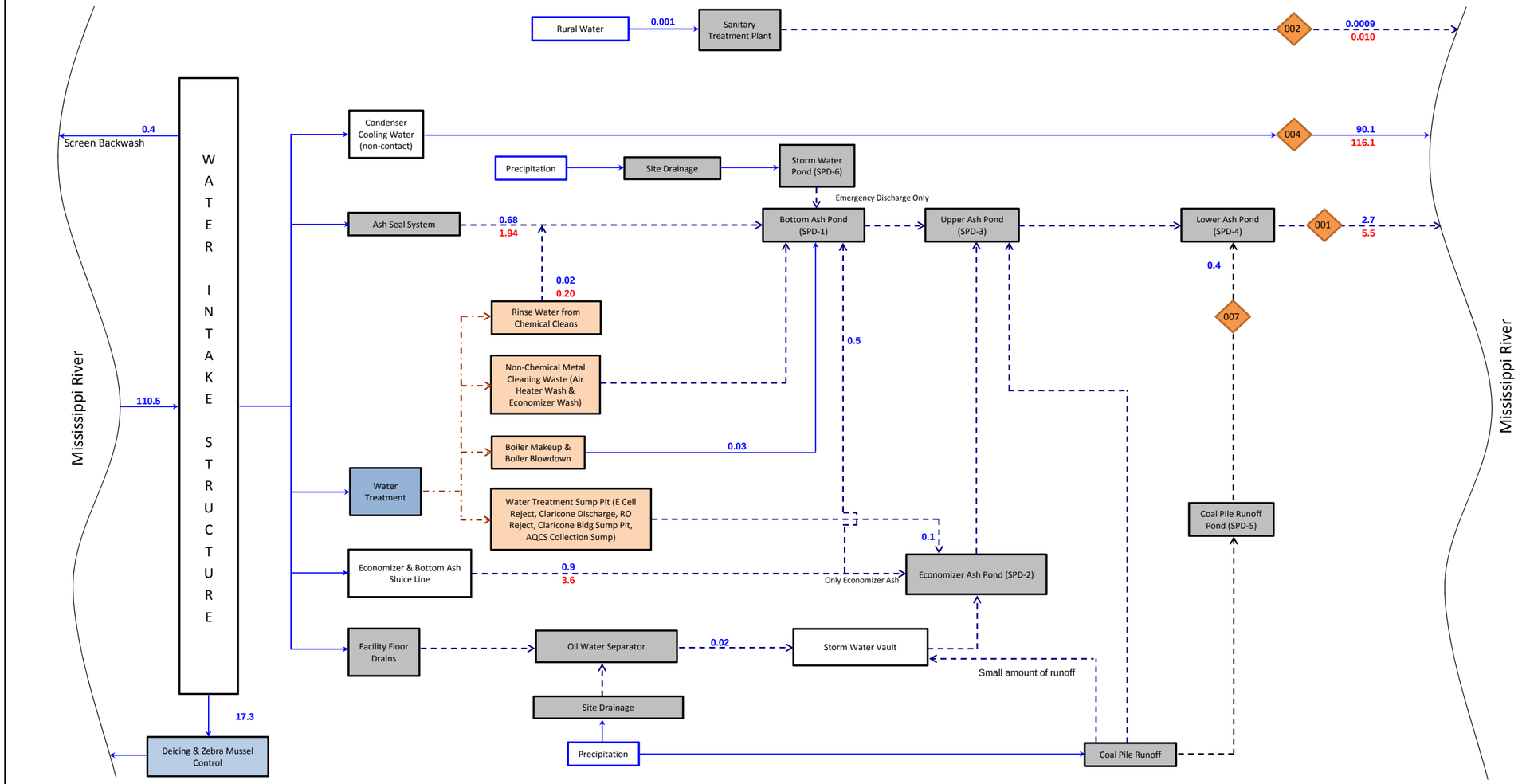
CLIENT / LOCATION	DRAWING DESCRIPTION	JOB	SHT.	DWG.
ALLIANT ENERGY BURLINGTON GENERATING STATION BURLINGTON, IOWA	INFLOW FLOOD CONTROL SITE PLAN	154.018.012.001	FIGURE 1	154.018.012.001-D1

APPENDIX A – BGS Water Balance Chart

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Inflow Design Flood Control System Plan



Flows

Expected flow (MGD)

Maximum flow (MGD)

Raw Water Source

Water Treatment Equipment

Treated Water Users

Steam/Condensate Cycle

Waste Water/Waste Water Treatment

Existing Equipment

Raw Water

Brine

Potable Water

Demin / Condensate Water

Intermittent Flows

Waste Water

Treated / Recycled Waste Water

Notes:

1 Flows are in MGD based on Burlington Project Summary - IPL Burlington Generating Station Water Balance Diagram.

Owner: ALLIANT ENERGY

Engineer: Sargent & Lundy LLC

Alliant - Burlington Generating Station

Water and Ash Planning Project

Preliminary Water Balance

MSK-BGS-WB-001

Drawing Release Record

Rev	Date	Prepared	Reviewed	Approved	Purpose
A0	11-Dec-15	K. Cheong	M.Heermann	D. Buchel	Intial Issue

Project No: 13391-015

APPENDIX B – NOAA Storm Frequency

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Inflow Design Flood Control System Plan

NOAA Atlas 14, Volume 8, Version 2
Location name: Burlington, Iowa, US*
Latitude: 40.7426°, Longitude: -91.1201°
Elevation: 545 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.384** (0.326–0.458)	**0.449** (0.381–0.537)	**0.555** (0.470–0.664)	**0.642** (0.541–0.770)	**0.760** (0.620–0.924)	**0.849** (0.680–1.04)	**0.937** (0.728–1.16)	**1.03** (0.769–1.29)	**1.14** (0.826–1.46)	**1.23** (0.869–1.59)
10-min	**0.562** (0.477–0.671)	**0.658** (0.559–0.786)	**0.813** (0.688–0.973)	**0.940** (0.792–1.13)	**1.11** (0.908–1.35)	**1.24** (0.995–1.52)	**1.37** (1.07–1.71)	**1.50** (1.13–1.89)	**1.67** (1.21–2.14)	**1.79** (1.27–2.32)
15-min	**0.685** (0.582–0.818)	**0.802** (0.681–0.958)	**0.991** (0.840–1.19)	**1.15** (0.966–1.38)	**1.36** (1.11–1.65)	**1.52** (1.21–1.86)	**1.67** (1.30–2.08)	**1.83** (1.37–2.31)	**2.04** (1.48–2.61)	**2.19** (1.55–2.83)
30-min	**0.952** (0.810–1.14)	**1.12** (0.953–1.34)	**1.39** (1.18–1.67)	**1.62** (1.36–1.94)	**1.91** (1.56–2.32)	**2.14** (1.71–2.62)	**2.36** (1.83–2.92)	**2.57** (1.93–3.24)	**2.85** (2.07–3.65)	**3.06** (2.17–3.96)
60-min	**1.23** (1.05–1.47)	**1.43** (1.22–1.71)	**1.77** (1.50–2.12)	**2.05** (1.73–2.46)	**2.44** (2.00–2.98)	**2.75** (2.20–3.38)	**3.06** (2.38–3.81)	**3.38** (2.54–4.27)	**3.81** (2.77–4.89)	**4.14** (2.94–5.36)
2-hr	**1.51** (1.30–1.79)	**1.75** (1.49–2.07)	**2.14** (1.83–2.54)	**2.48** (2.11–2.95)	**2.97** (2.46–3.61)	**3.36** (2.72–4.11)	**3.76** (2.96–4.66)	**4.19** (3.18–5.26)	**4.77** (3.50–6.09)	**5.22** (3.74–6.71)
3-hr	**1.69** (1.45–1.99)	**1.93** (1.66–2.28)	**2.36** (2.02–2.78)	**2.74** (2.33–3.23)	**3.29** (2.75–4.00)	**3.75** (3.06–4.58)	**4.24** (3.35–5.24)	**4.75** (3.63–5.97)	**5.48** (4.04–6.98)	**6.06** (4.36–7.74)
6-hr	**1.99** (1.72–2.32)	**2.28** (1.98–2.66)	**2.80** (2.42–3.28)	**3.27** (2.81–3.83)	**3.97** (3.34–4.79)	**4.55** (3.75–5.52)	**5.18** (4.13–6.36)	**5.85** (4.51–7.29)	**6.79** (5.06–8.59)	**7.55** (5.48–9.58)
12-hr	**2.29** (2.00–2.65)	**2.68** (2.34–3.10)	**3.35** (2.92–3.89)	**3.95** (3.42–4.58)	**4.81** (4.07–5.75)	**5.52** (4.57–6.63)	**6.27** (5.04–7.62)	**7.06** (5.47–8.71)	**8.16** (6.12–10.2)	**9.03** (6.60–11.4)
24-hr	**2.66** (2.34–3.04)	**3.11** (2.74–3.57)	**3.90** (3.42–4.48)	**4.58** (4.00–5.27)	**5.57** (4.75–6.58)	**6.37** (5.31–7.57)	**7.21** (5.83–8.68)	**8.09** (6.32–9.88)	**9.30** (7.03–11.5)	**10.3** (7.57–12.8)
2-day	**3.11** (2.76–3.53)	**3.58** (3.17–4.06)	**4.38** (3.87–4.98)	**5.08** (4.47–5.80)	**6.11** (5.25–7.16)	**6.95** (5.85–8.19)	**7.83** (6.40–9.35)	**8.76** (6.91–10.6)	**10.1** (7.67–12.4)	**11.1** (8.24–13.7)
3-day	**3.38**	**3.89**	**4.74**	**5.48**	**6.54**	**7.39**	**8.27**	**9.20**	**10.5**	**11.5**

	(3.01–3.82)	(3.46–4.39)	(4.20–5.36)	(4.83–6.21)	(5.63–7.59)	(6.24–8.64)	(6.78–9.81)	(7.28–11.1)	(8.02–12.8)	(8.58–14.1)
4-day	**3.61** (3.23–4.06)	**4.15** (3.70–4.67)	**5.04** (4.49–5.69)	**5.81** (5.15–6.57)	**6.90** (5.96–7.97)	**7.77** (6.57–9.03)	**8.66** (7.12–10.2)	**9.58** (7.60–11.5)	**10.8** (8.32–13.2)	**11.8** (8.87–14.5)
7-day	**4.26** (3.83–4.75)	**4.84** (4.35–5.41)	**5.81** (5.20–6.50)	**6.63** (5.91–7.44)	**7.79** (6.76–8.91)	**8.70** (7.40–10.0)	**9.63** (7.96–11.3)	**10.6** (8.45–12.6)	**11.9** (9.18–14.4)	**12.9** (9.73–15.7)
10-day	**4.86** (4.39–5.40)	**5.48** (4.95–6.09)	**6.52** (5.86–7.25)	**7.39** (6.61–8.25)	**8.61** (7.51–9.81)	**9.57** (8.18–11.0)	**10.6** (8.76–12.3)	**11.6** (9.27–13.7)	**12.9** (10.0–15.5)	**14.0** (10.6–17.0)
20-day	**6.63** (6.03–7.29)	**7.42** (6.75–8.17)	**8.71** (7.90–9.61)	**9.79** (8.83–10.8)	**11.3** (9.88–12.7)	**12.4** (10.7–14.1)	**13.5** (11.3–15.6)	**14.7** (11.9–17.2)	**16.2** (12.7–19.3)	**17.4** (13.3–20.9)
30-day	**8.11** (7.42–8.88)	**9.10** (8.31–9.96)	**10.7** (9.73–11.7)	**12.0** (10.9–13.2)	**13.7** (12.1–15.3)	**15.0** (13.0–16.9)	**16.3** (13.7–18.7)	**17.6** (14.3–20.5)	**19.3** (15.1–22.8)	**20.5** (15.8–24.6)
45-day	**10.0** (9.19–10.9)	**11.3** (10.3–12.3)	**13.3** (12.2–14.5)	**14.9** (13.6–16.3)	**17.0** (15.0–18.8)	**18.6** (16.1–20.8)	**20.1** (16.9–22.8)	**21.6** (17.6–24.9)	**23.4** (18.5–27.5)	**24.7** (19.1–29.5)
60-day	**11.6** (10.7–12.6)	**13.2** (12.1–14.3)	**15.6** (14.3–16.9)	**17.5** (16.0–19.1)	**20.0** (17.7–22.0)	**21.8** (18.9–24.2)	**23.5** (19.8–26.5)	**25.1** (20.5–28.8)	**27.1** (21.4–31.7)	**28.5** (22.1–33.8)

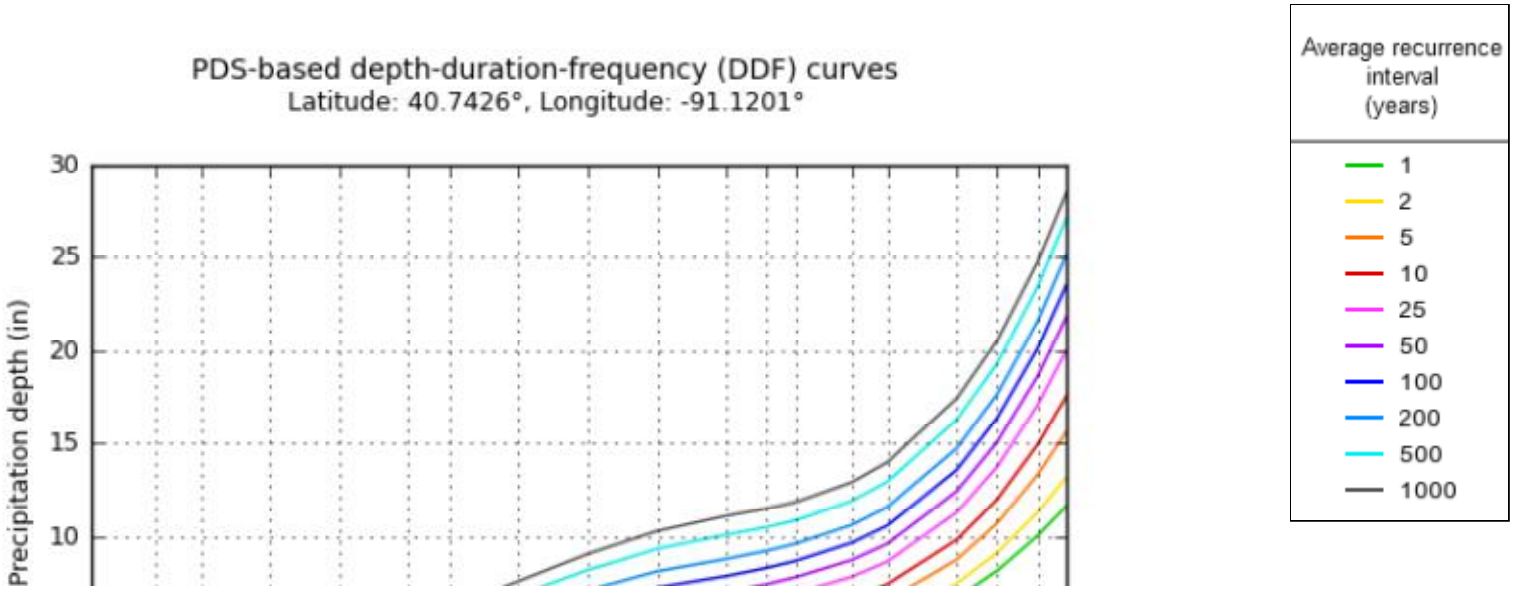
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

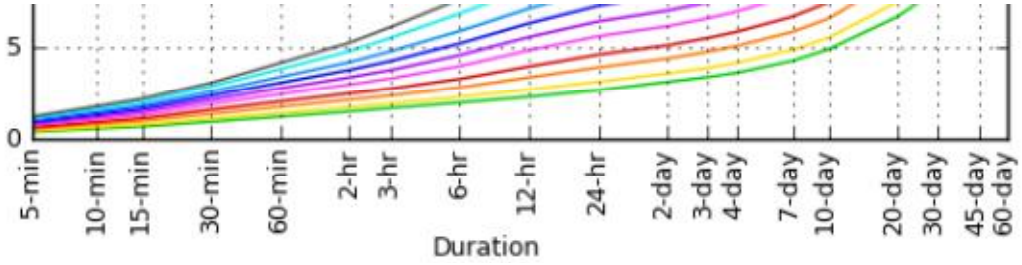
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

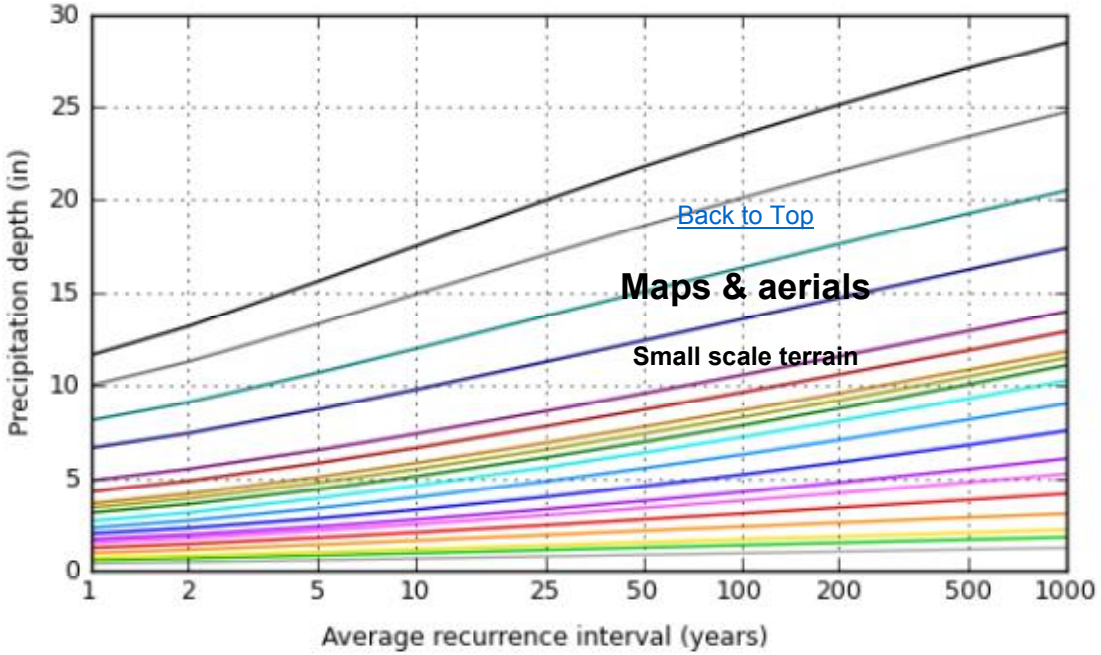
Please refer to NOAA Atlas 14 document for more information.

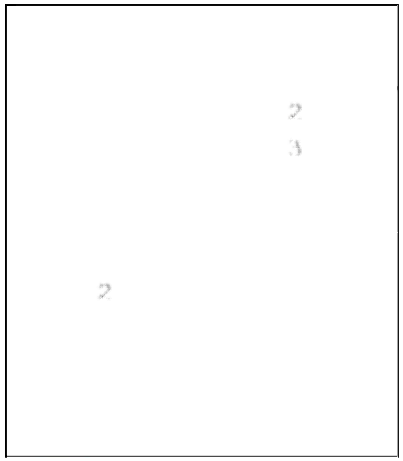
Back to Top

PF graphical









Back to Top

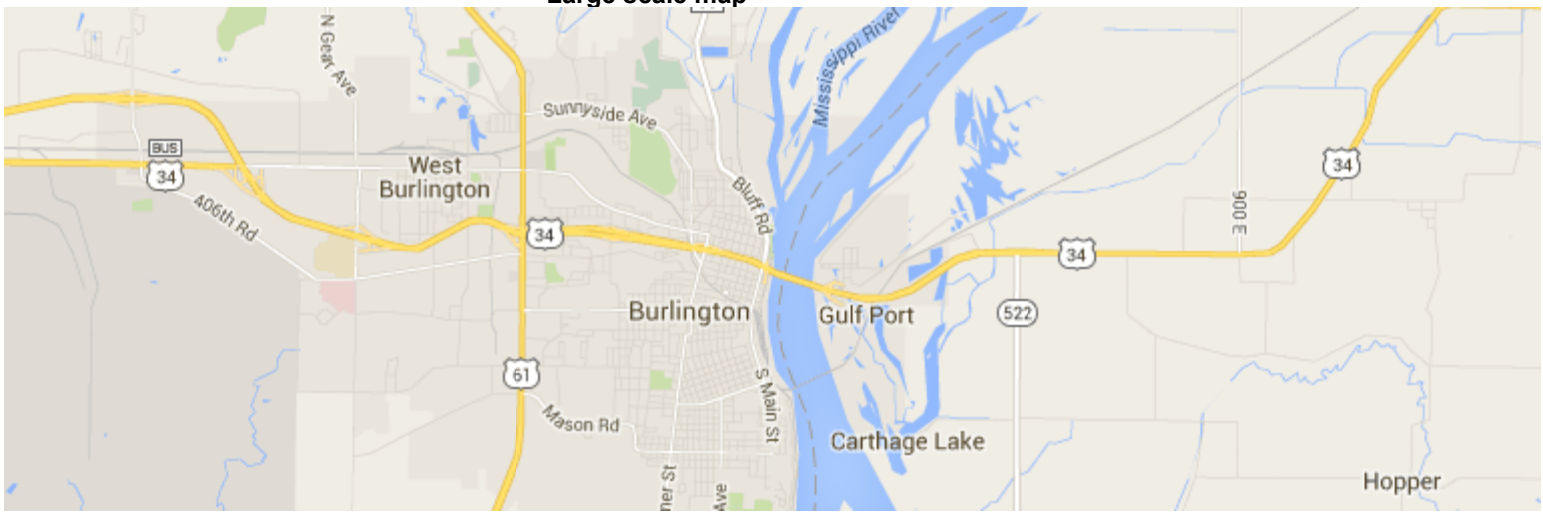
Maps & aerials

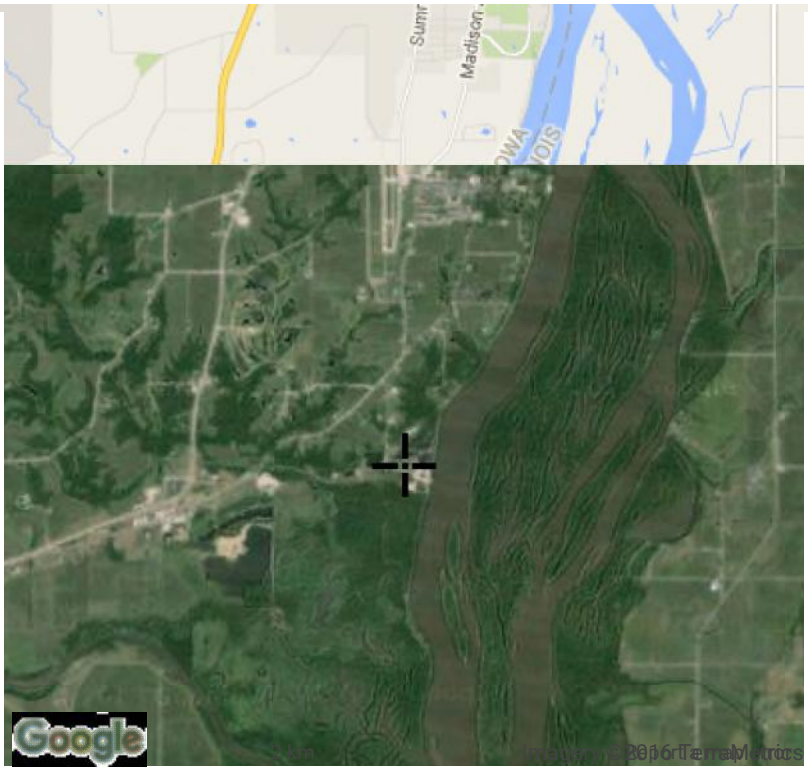
Small scale terrain

NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Fri Apr 1 13:24:39 2016

Large scale map





Back to Top

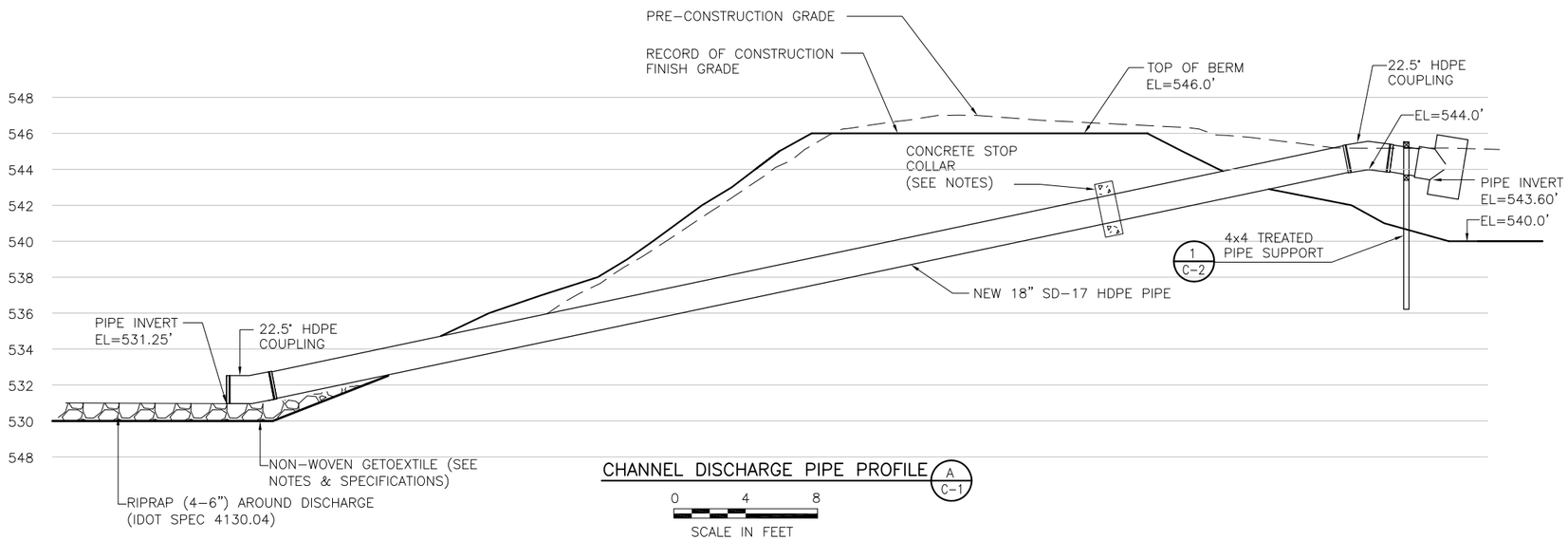
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX C – Outfall Drawings

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

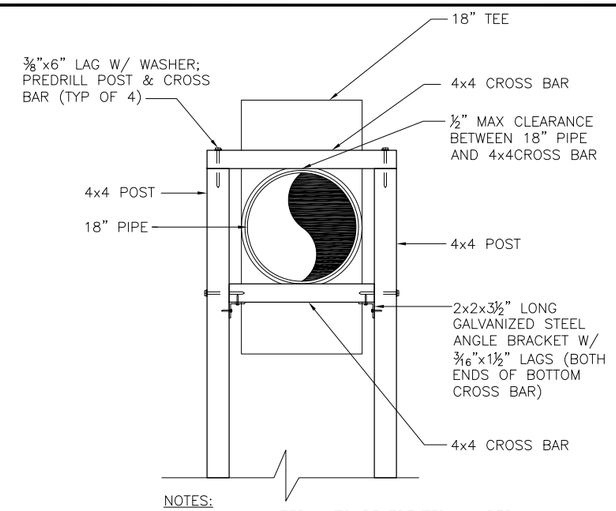
Inflow Design Flood Control System Plan



CHANNEL DISCHARGE PIPE PROFILE (A C-1)

0 4 8

SCALE IN FEET

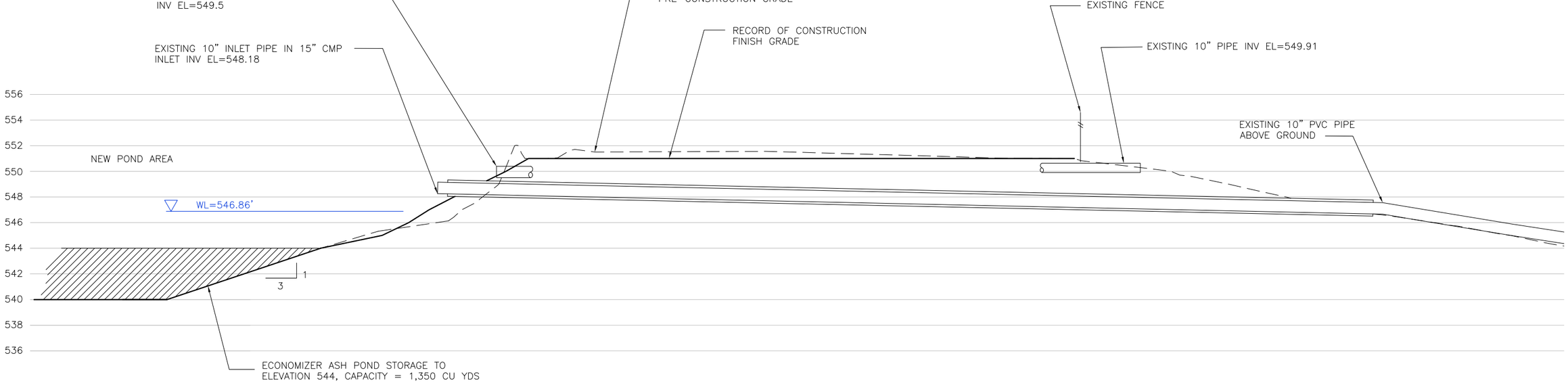


NOTES:
1. ALL 4x4 MATERIAL TO BE TREATED LUMBER.
2. ALL ANGLES AND FASTENERS TO BE GALVANIZED STEEL.
3. PIPE SUPPORT TO BE LOCATED ON 18" PIPE JUST BEFORE TEE ATTACHMENT.

4x4 PIPE SUPPORT (1 C-2) (1 C-3)

0 1 2

SCALE IN FEET



POND INLET PIPE PROFILE (B C-1)

0 4 8

SCALE IN FEET

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2	11/21/11	RGM	RECORD OF CONSTRUCTION
1	8/22/11	MWL	REVISED POND LOCATION

aether dbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	8-22-11
DRAWN BY:	JFD
CHKD. BY:	CTS
APPROVED:	MWL

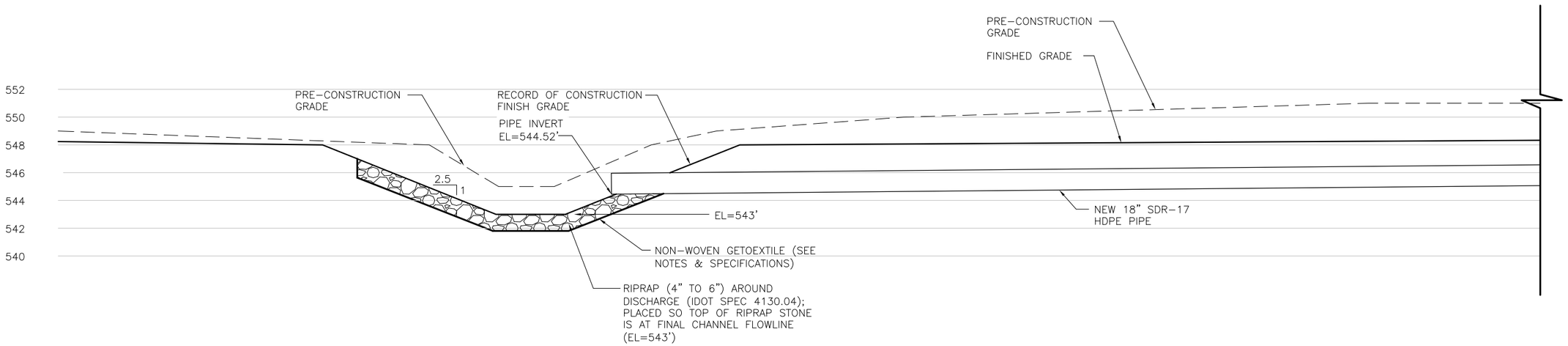
CLIENT / LOCATION

INTERSTATE POWER & LIGHT
ECONOMIZER ASH PILE AND POND DESIGN
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

DRAWING DESCRIPTION

GRADING SECTIONS A & B

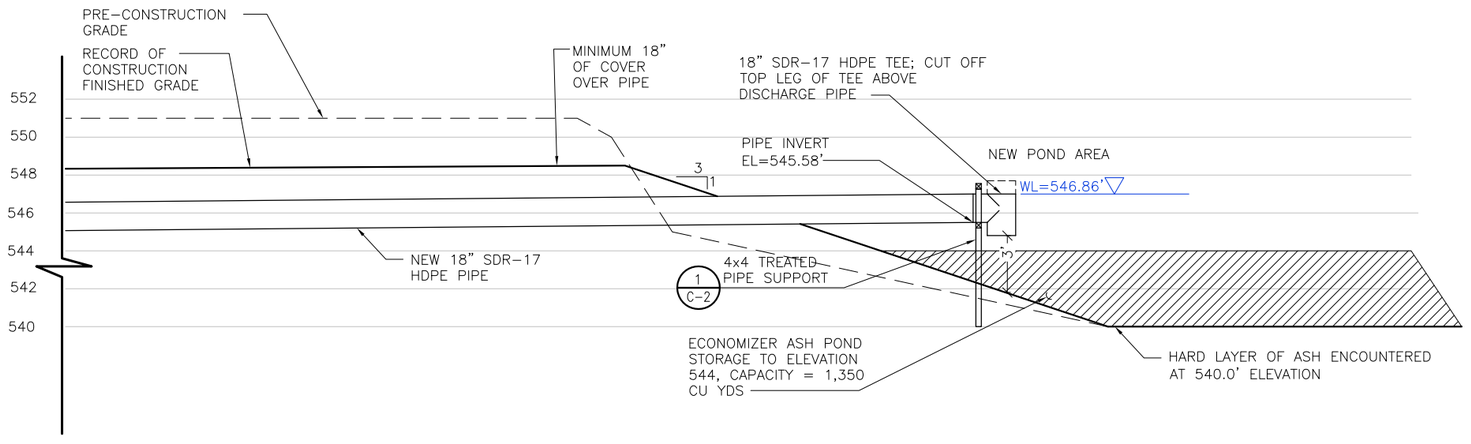
JOB 154.002.013
SHT. C-2
DWG. 154002013-C2



POND DISCHARGE PIPE PROFILE (C / C-1)

0 4 8

SCALE IN FEET



POND DISCHARGE PIPE PROFILE (CONT) (C / C-1)

0 4 8

SCALE IN FEET

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2	11/21/11	RGM	RECORD OF CONSTRUCTION
1	8/22/11	MWL	REVISED POND LOCATION

aether dbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	8-22-11
DRAWN BY:	JFD
CHKD. BY:	CTS
APPROVED:	MWL

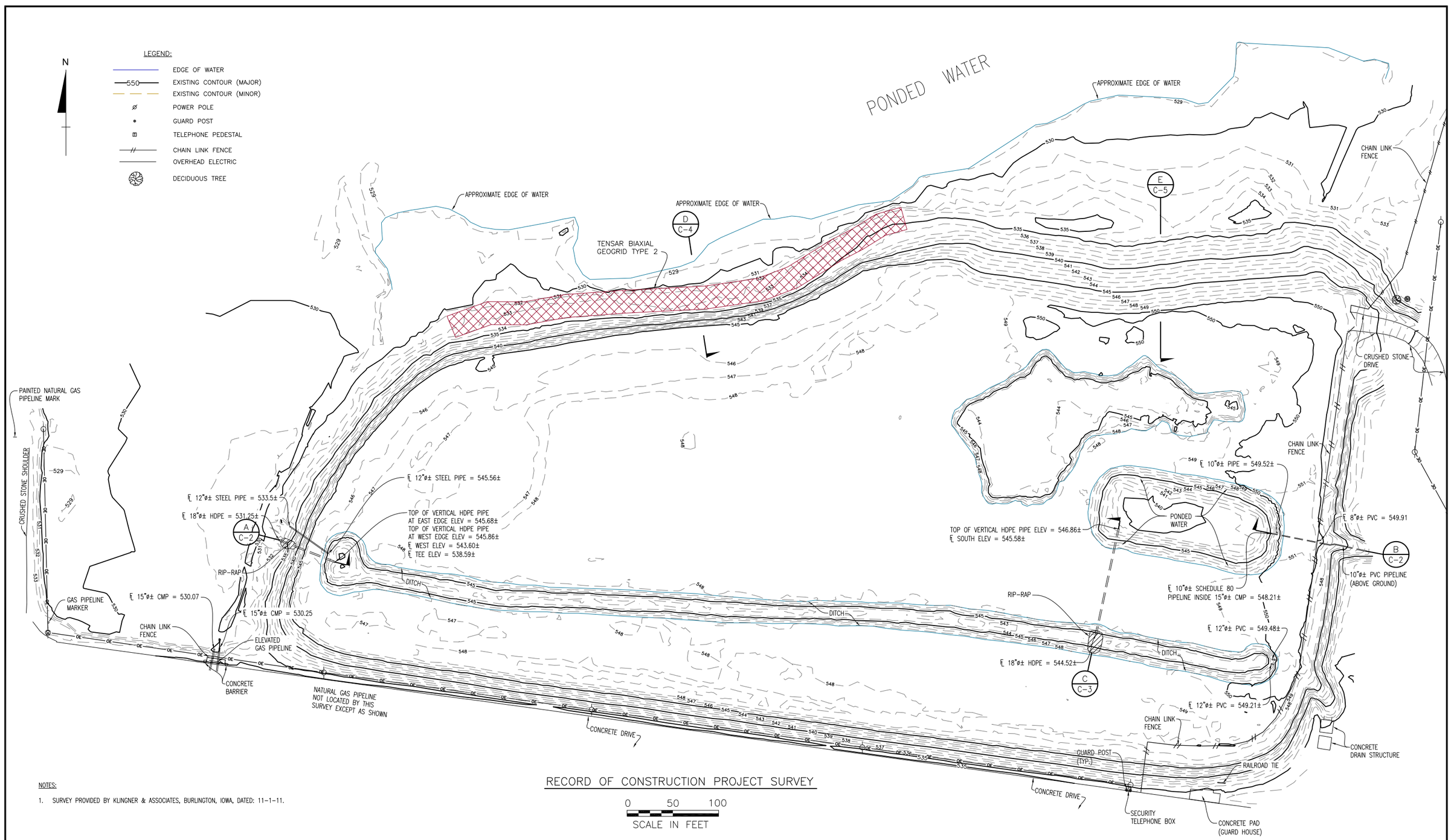
CLIENT / LOCATION

INTERSTATE POWER & LIGHT
ECONOMIZER ASH PILE AND POND DESIGN
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

DRAWING DESCRIPTION

GRADING SECTION C

JOB	154.002.013
SHT.	C-3
DWG.	154002013-C3



NOTES:

1. SURVEY PROVIDED BY KLINGNER & ASSOCIATES, BURLINGTON, IOWA, DATED: 11-1-11.

RECORD OF CONSTRUCTION PROJECT SURVEY

0 50 100

SCALE IN FEET

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1	11/21/11	RGM	RECORD OF CONSTRUCTION

aether dbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	1-3-11
DRAWN BY:	JFD
CHKD. BY:	CTS
APPROVED:	MWL

CLIENT / LOCATION

INTERSTATE POWER & LIGHT
ECONOMIZER ASH PILE AND POND DESIGN
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

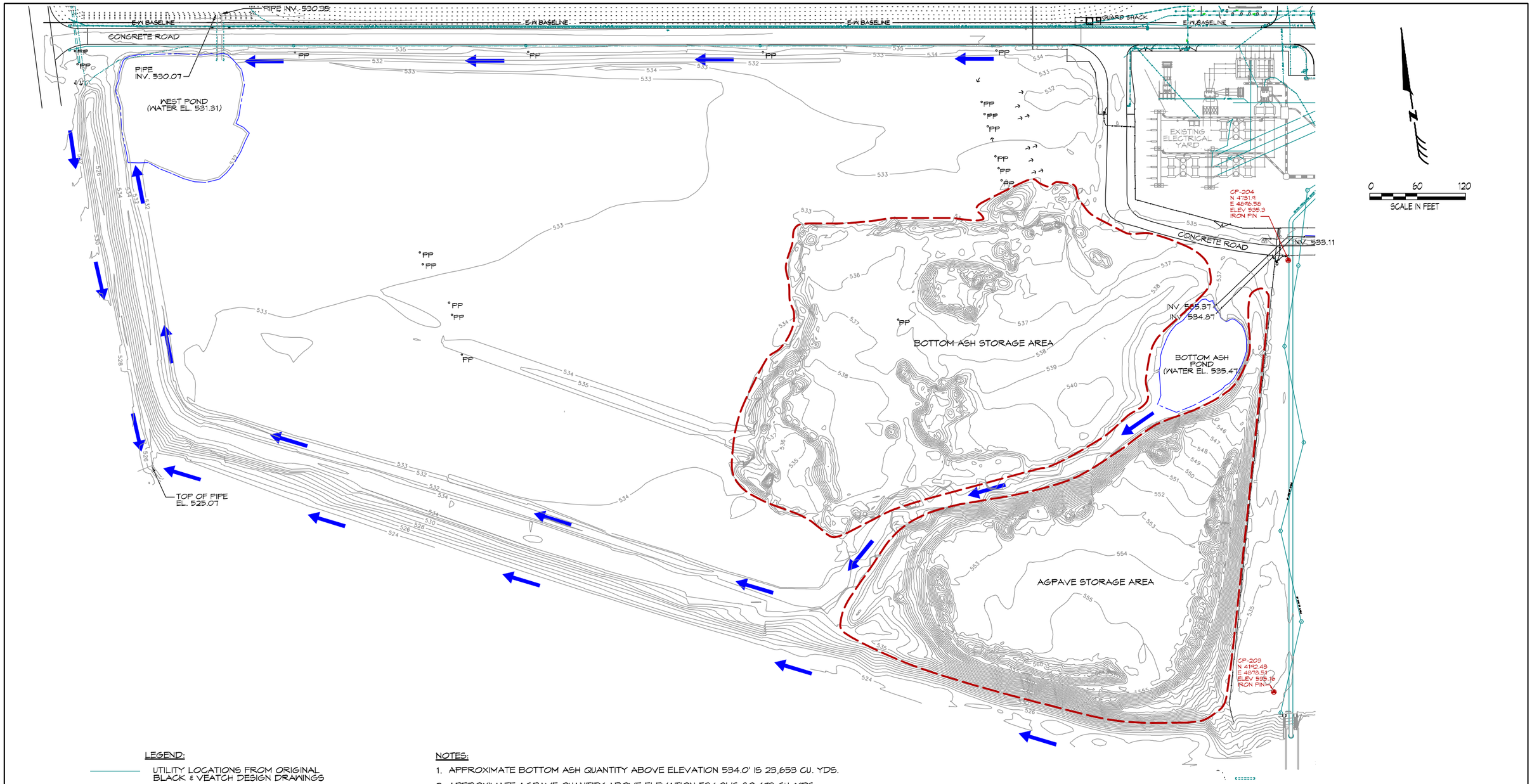
DRAWING DESCRIPTION

POST-CONSTRUCTION TOPOGRAPHIC SURVEY

JOB 154.002.013

SHT. C-1

DWG. 154002013-C1



LEGEND:

- UTILITY LOCATIONS FROM ORIGINAL BLACK & VEATCH DESIGN DRAWINGS
- SURVEYED UTILITY LOCATIONS
- EDGE OF WATER
- ESTIMATED CONTOURS SUPPLIED BY ALLIANT ENERGY
- 536 SURVEYED CONTOURS
- GRAVEL ROAD
- °PP POWER POLE
- CONTROL POINT / MONUMENT
- OVERLAND FLOW DIRECTION

NOTES:

1. APPROXIMATE BOTTOM ASH QUANTITY ABOVE ELEVATION 534.0' IS 23,653 CU. YDS.
2. APPROXIMATE AGPAVE QUANTITY ABOVE ELEVATION 534.0' IS 80,493 CU. YDS.

EXISTING CONDITIONS - WEST

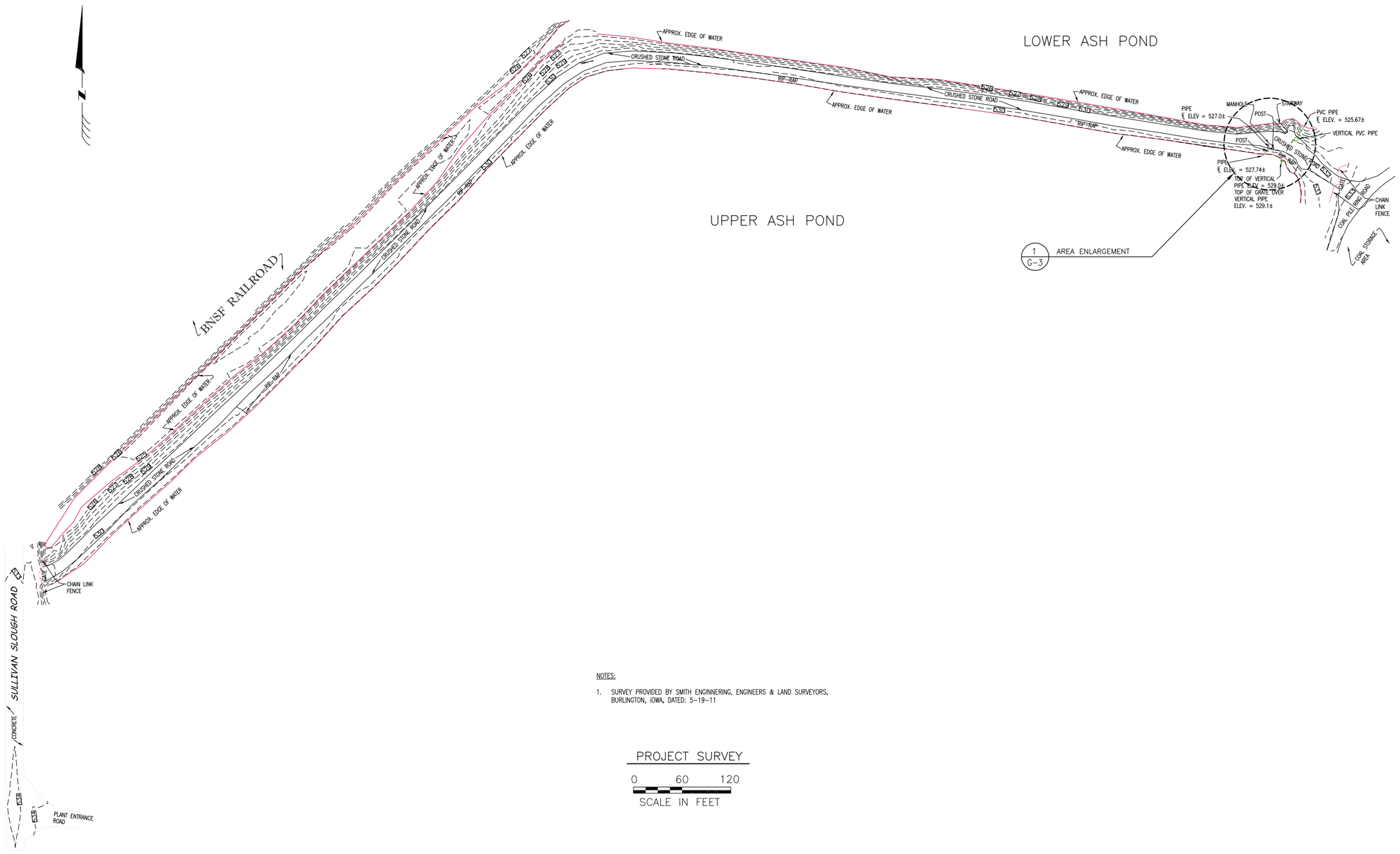
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

PREPARED FOR

ALLIANT ENERGY

HARD HAT SERVICES™
Engineering, Construction and Management Solutions
940 East Diehl Road, Suite 150 Naperville, Illinois 60563
www.hardhatinc.com

DATE: 3-27-09	SHEET 2	DRAWING NUMBER 154.002.D2
SCALE: AS SHOWN		



NOTES:

1. SURVEY PROVIDED BY SMITH ENGINNERING, ENGINEERS & LAND SURVEYORS, BURLINGTON, IOWA, DATED: 5-19-11

PROJECT SURVEY

0 60 120

SCALE IN FEET

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

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www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	9-19-11
DRAWN BY:	JFD
CHKD. BY:	
APPROVED:	

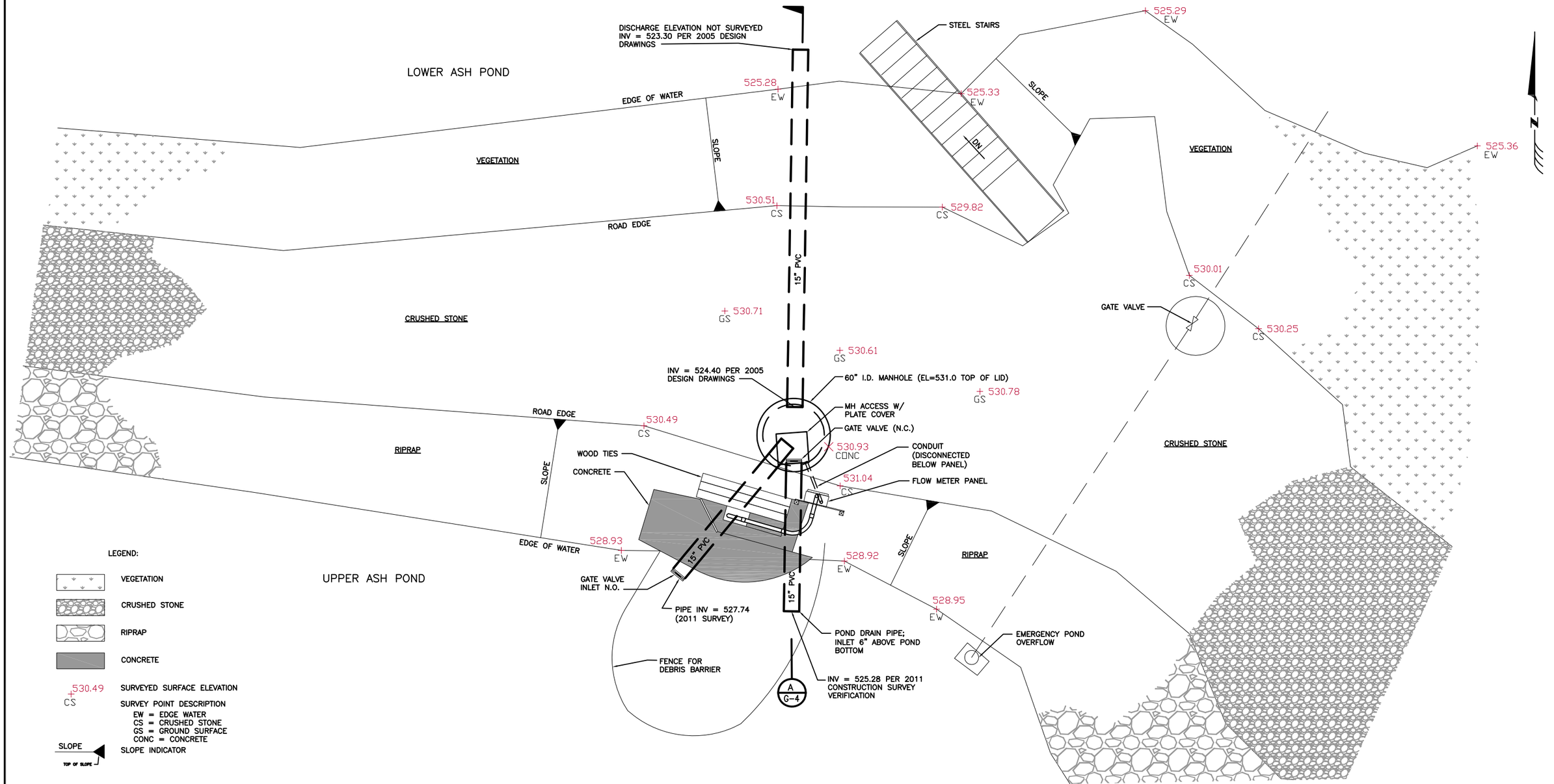
CLIENT / LOCATION

INTERSTATE POWER & LIGHT
UPPER ASH POND OUTFALL CONSTRUCTION AS-BUILTS
BURLINGTON GENERATING STATION
BURLINGTON, IA

DRAWING DESCRIPTION

PROJECT AREA SURVEY

JOB 154.002.010.001
SHT. G-2
DWG. 154002010-G2



REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

aetherdbs
www.aetherdbs.com

SCALE:	AS SHOWN
DATE:	9-19-11
DRAWN BY:	JFD
CHKD. BY:	
APPROVED:	

CLIENT / LOCATION
INTERSTATE POWER & LIGHT
UPPER ASH POND OUTFALL CONSTRUCTION AS-BUILTS
BURLINGTON GENERATING STATION
BURLINGTON, IA

DRAWING DESCRIPTION
PROJECT AREA ENLARGEMENT

JOB 154.002.010.001
SHT. G-3
DWG. 154002010-G3

APPENDIX D – BGS Ash Seal Pond Analysis

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Inflow Design Flood Control System Plan

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

SHEET NO. 1 OF 1
PROJECT NO.
DATE APRIL 24, 2016
BY TJH CKD MWL

ASH SEAL POND
INFLOW FLOOD ANALYSIS

PONDED AREA = 5.7 ACRES ✓
ADDITIONAL WATERSHED* = 2.0 ACRES ✓
TOTAL = 7.7 ACRES ✓

1000 YEAR RETURN STORM = 10.3 INCHES ✓

TOTAL STORED VOLUME (NO EXFILTRATION)

VOLUME = 10.3 INCHES / 12 IN/FT × 7.7 ACRES ✓
= 6.6 ACRE/FEET ✓
= 287,500 FEET^3 ✓

** BOTTOM ELEVATION IN SOUTHWEST CORNER 531 FT.

AREA @ 531	30,000 ft²	>	1.4 ACRE-FT ✓
AREA @ 532	90,000 ft²	>	3.3 ACRE-FT ✓
AREA @ 533	200,000 ft²	>	4.6 ACRE-FT ✓
AREA @ 534	200,000 ft²		
			9.3 ACRE-FT ✓

WATER ELEVATION = $\frac{6.6 \text{ ACRE-FT} - 1.4 \text{ ACRE-FT} - 3.3 \text{ ACRE-FT}}{4.6 \text{ ACRE-FT}}$ + 533' ✓

= 533.4 FT ✓

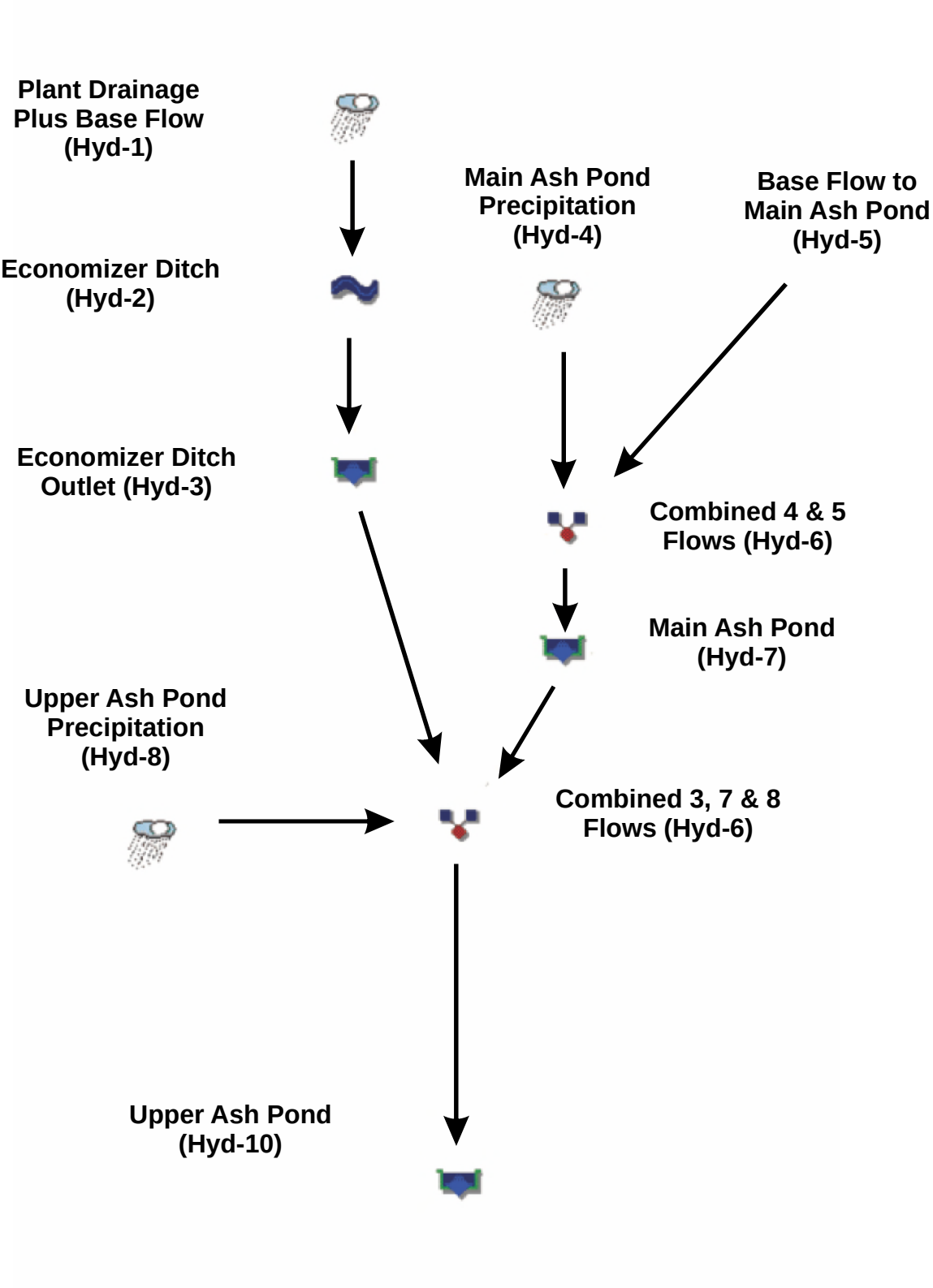
* AREA SOUTH OF MAIN PLANT (FLYASH HANDLING AREA) ✓
** ELEVATIONS FROM GOOGLE EARTH ✓

APPENDIX E – Ash Pond Hydraulic Analysis

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Inflow Design Flood Control System Plan

HYDRAFLOW MODEL DIAGRAM



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	Manual	19.30	4	704	8.743	----	------	------	Plant Area Drainage Pumps & Base Flow
2	Reach	19.30	4	836	8.780	1	------	------	Economizer Ditch
3	Reservoir	19.30	4	836	8.714	2	547.21	0.201	Econ. Ditch Outlet
4	SCS Runoff	136.99	4	728	12.342	----	------	------	Main Ash Pond Runoff
5	Manual	1.00	4	0	2.011	----	------	------	Main Ash Pond Base Flow
6	Combine	138.49	4	728	15.359	4, 5	------	------	Main Ash Pond Inflow
7	Reservoir	13.77	4	788	15.350	6	533.38	6.277	Main Ash Pond Outflow
8	SCS Runoff	237.81	4	724	18.127	----	------	------	Economizer Area Runoff
9	Combine	264.05	4	724	42.192	3, 7, 8	------	---- -	Upper Ash Pond Inflow
10	Reservoir	9.40	4	1464	42.022	9	530.27	30.156	Upper Ash Pond Outflow

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Plant Area Drainage Pumps

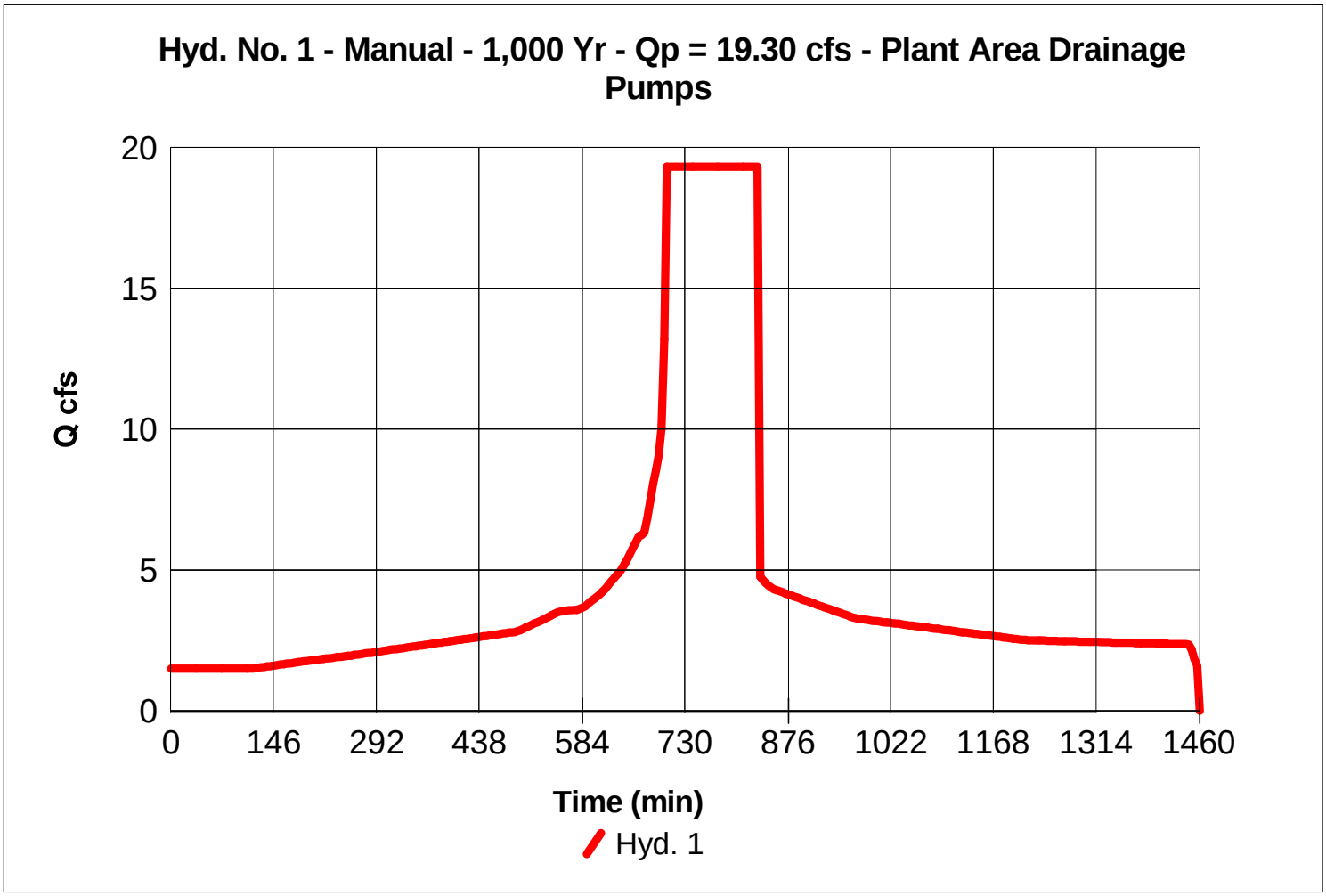
Hydrograph type	= Manual	Peak discharge	= 19.30 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min

Hydrograph Volume = 8.743 acft

Hydrograph Discharge Table

Time (min)	Outflow (cfs)
248	1.94
288	2.07
328	2.22
368	2.36
408	2.51
448	2.65
488	2.80
528	3.24
568	3.57
608	4.12
648	5.41
688	8.55
728	19.30 <<
768	19.30 <<
808	19.30 <<
848	4.44
888	4.02
928	3.66
968	3.31
1008	3.16
1048	3.03
1088	2.90
1128	2.77
1168	2.64
1208	2.52
1248	2.48
1288	2.45
1328	2.43
1368	2.40
1408	2.38
1448	2.18

...End


Hyd. No. 1 - Manual - 1,000 Yr - Qp = 19.30 cfs - Plant Area Drainage Pumps
Q cfs
20
15
10
5
0
0
146
292
438
584
730
876
1022
1168
1314
1460
Time (min)
Hyd. 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Economizer Ditch

Hydrograph type	= Reach	Peak discharge	= 19.30 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Inflow hyd. No.	= 1	Section type	= Trapezoidal
Reach length	= 1000.0 ft	Channel slope	= 0.00 %
Manning's n	= 0.009	Bottom width	= 5.00 ft
Side slope	= 2.5:1	Max. depth	= 4.00 ft
Rating curve x	= 0.253	Rating curve m	= 1.350
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.2240

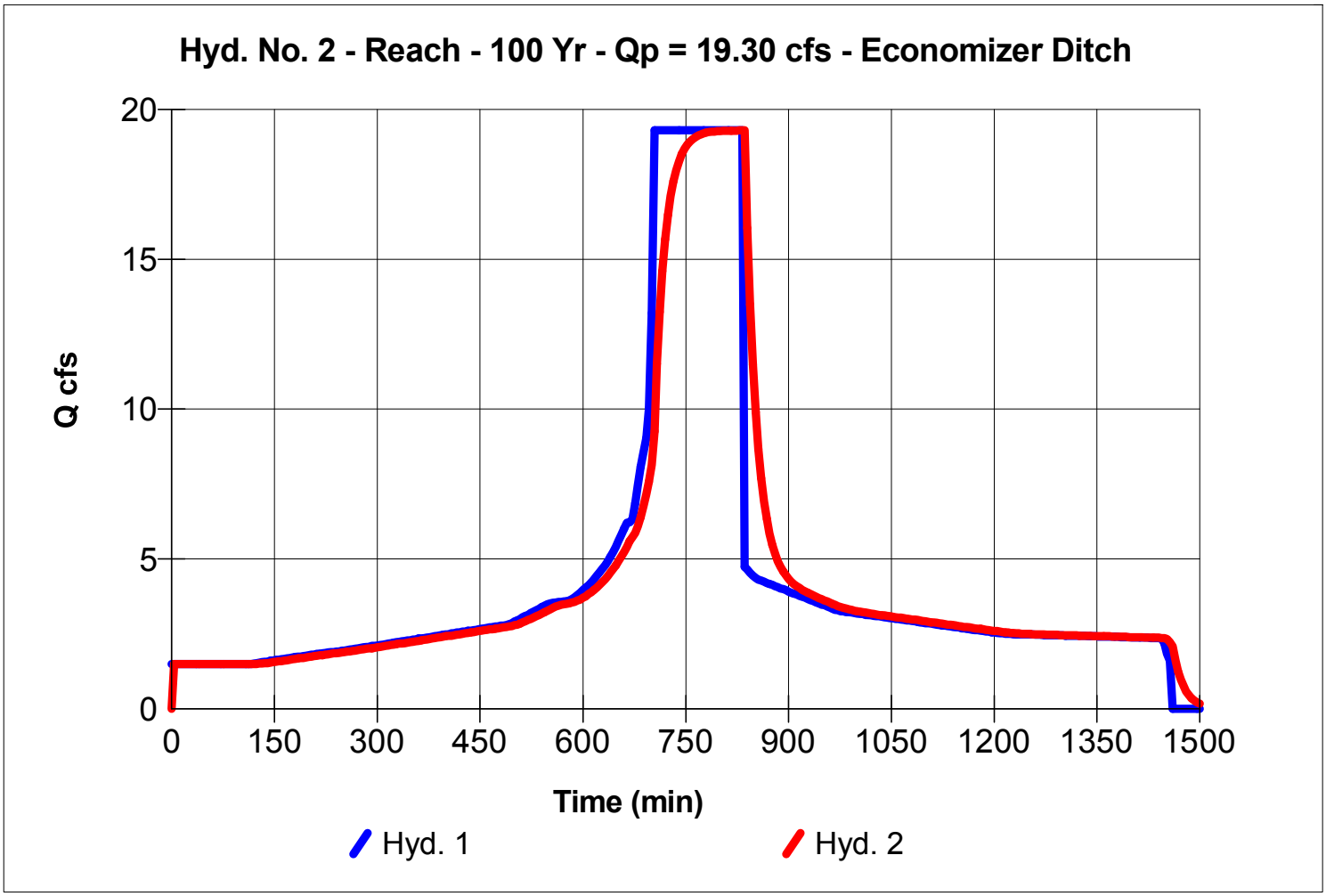
Modified Att-Kin routing method used.

Hydrograph Volume = 8.780 acft

Hydrograph Discharge Table

Time (min)	Inflow cfs	Outflow cfs
280	2.05	1.98
320	2.19	2.13
360	2.34	2.27
400	2.48	2.42
440	2.62	2.56
480	2.77	2.70
520	3.14	2.96
560	3.55	3.41
600	3.96	3.70
640	5.06	4.54
680	7.46	6.08
720	19.30 <<	15.66
760	19.30 <<	19.01
800	19.30 <<	19.28
840	4.64	16.04
880	4.09	5.17
920	3.73	3.97
960	3.38	3.54
1000	3.18	3.26
1040	3.05	3.11
1080	2.93	2.98
1120	2.80	2.85
1160	2.67	2.73
1200	2.54	2.60
1240	2.49	2.51
1280	2.46	2.47
1320	2.43	2.45
1360	2.41	2.42
1400	2.38	2.40
1440	2.36	2.37

...End


Hyd. No. 2 - Reach - 100 Yr - Qp = 19.30 cfs - Economizer Ditch
Q cfs
20
15
10
5
0
0
150
300
450
600
750
900
1050
1200
1350
1500
Time (min)
Hyd. 1
Hyd. 2

Hydrograph Report

Hyd. No. 3

Econ. Ditch Outlet

Hydrograph type	= Reservoir	Peak discharge	= 19.30 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Inflow hyd. No.	= 2	Reservoir name	= Economizer Outlet
Max. Elevation	= 547.21 ft	Max. Storage	= 0.201 acft

Storage Indication method used.

Outflow hydrograph volume = 8.714 acft

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
280	1.98	544.68	1.97	-----	-----	-----	-----	-----	-----	-----	-----	1.97
320	2.13	544.70	2.11	-----	-----	-----	-----	-----	-----	-----	-----	2.11
360	2.27	544.73	2.25	-----	-----	-----	-----	-----	-----	-----	-----	2.25
400	2.42	544.76	2.40	-----	-----	-----	-----	-----	-----	-----	-----	2.40
440	2.56	544.78	2.54	-----	-----	-----	-----	-----	-----	-----	-----	2.54
480	2.70	544.81	2.69	-----	-----	-----	-----	-----	-----	-----	-----	2.69
520	2.96	544.85	2.91	-----	-----	-----	-----	-----	-----	-----	-----	2.91
560	3.41	544.93	3.35	-----	-----	-----	-----	-----	-----	-----	-----	3.35
600	3.70	544.98	3.64	-----	-----	-----	-----	-----	-----	-----	-----	3.64
640	4.54	545.11	4.40	-----	-----	-----	-----	-----	-----	-----	-----	4.40
680	6.08	545.43	5.73	-----	-----	-----	-----	-----	-----	-----	-----	5.73
720	15.66	546.91	9.78	3.40	-----	-----	-----	-----	-----	-----	-----	13.18
760	19.01	547.20	10.39	3.96	-----	-----	4.64	-----	-----	-----	-----	18.99
800	19.28	547.21	10.40	3.98	-----	-----	4.89	-----	-----	-----	-----	19.28
840	16.04	547.15	10.29	3.88	-----	-----	3.10	-----	-----	-----	-----	17.27
880	5.17	545.51	6.03	-----	-----	-----	-----	-----	-----	-----	-----	6.03
920	3.97	545.05	4.05	-----	-----	-----	-----	-----	-----	-----	-----	4.05
960	3.54	544.97	3.59	-----	-----	-----	-----	-----	-----	-----	-----	3.59
1000	3.26	544.91	3.28	-----	-----	-----	-----	-----	-----	-----	-----	3.28
1040	3.11	544.89	3.13	-----	-----	-----	-----	-----	-----	-----	-----	3.13
1080	2.98	544.87	3.00	-----	-----	-----	-----	-----	-----	-----	-----	3.00
1120	2.85	544.84	2.87	-----	-----	-----	-----	-----	-----	-----	-----	2.87
1160	2.73	544.82	2.74	-----	-----	-----	-----	-----	-----	-----	-----	2.74
1200	2.60	544.80	2.61	-----	-----	-----	-----	-----	-----	-----	-----	2.61
1240	2.51	544.78	2.51	-----	-----	-----	-----	-----	-----	-----	-----	2.51
1280	2.47	544.77	2.48	-----	-----	-----	-----	-----	-----	-----	-----	2.47
1320	2.45	544.77	2.45	-----	-----	-----	-----	-----	-----	-----	-----	2.45
1360	2.42	544.76	2.42	-----	-----	-----	-----	-----	-----	-----	-----	2.42
1400	2.40	544.76	2.40	-----	-----	-----	-----	-----	-----	-----	-----	2.40
1440	2.37	544.75	2.37	-----	-----	-----	-----	-----	-----	-----	-----	2.37

...End

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - Economizer Outlet

Pond Data

Bottom LxW = 20.0 x 22.0 ft Side slope = 2.5:1 Bottom elev. = 541.00 ft Depth = 6.30 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	541.00	440	0.000	0.000
0.32	541.32	509	0.003	0.003
0.63	541.63	582	0.004	0.007
0.95	541.95	661	0.004	0.012
1.26	542.26	744	0.005	0.017
1.58	542.58	833	0.006	0.023
1.89	542.89	926	0.006	0.029
2.21	543.21	1,025	0.007	0.036
2.52	543.52	1,128	0.008	0.044
2.84	543.84	1,236	0.009	0.052
3.15	544.15	1,350	0.009	0.062
3.47	544.47	1,468	0.010	0.072
3.78	544.78	1,591	0.011	0.083
4.10	545.10	1,719	0.012	0.095
4.41	545.41	1,852	0.013	0.108
4.73	545.73	1,990	0.014	0.122
5.04	546.04	2,133	0.015	0.137
5.36	546.36	2,281	0.016	0.153
5.67	546.67	2,434	0.017	0.170
5.99	546.99	2,592	0.018	0.188
6.30	547.30	2,755	0.019	0.207

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 15.8	12.0	0.0	0.0
Span in	= 15.8	12.0	0.0	0.0
No. Barrels	= 1	1	0	0
Invert El. ft	= 544.00	545.60	0.00	0.00
Length ft	= 65.0	50.0	0.0	0.0
Slope %	= 19.60	24.00	0.00	0.00
N-Value	= .011	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

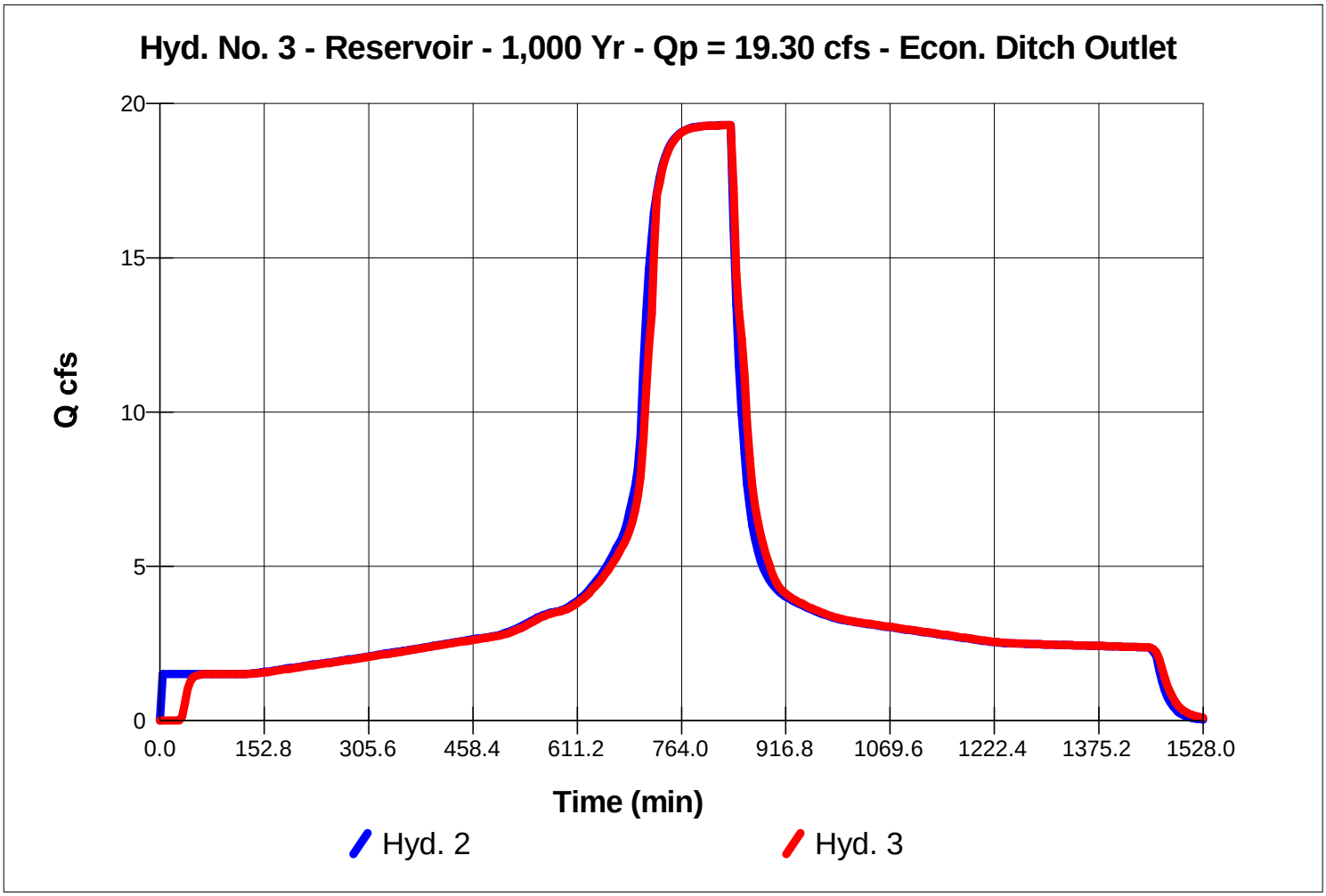
	[A]	[B]	[C]	[D]
Crest Len ft	= 20.00	0.00	0.00	0.00
Crest El. ft	= 547.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	541.00	0.00	0.00	---	---	0.00	---	---	---	---	0.00
0.32	0.003	541.32	0.00	0.00	---	---	0.00	---	---	---	---	0.00
0.63	0.007	541.63	0.00	0.00	---	---	0.00	---	---	---	---	0.00
0.95	0.012	541.95	0.00	0.00	---	---	0.00	---	---	---	---	0.00
1.26	0.017	542.26	0.00	0.00	---	---	0.00	---	---	---	---	0.00
1.58	0.023	542.58	0.00	0.00	---	---	0.00	---	---	---	---	0.00
1.89	0.029	542.89	0.00	0.00	---	---	0.00	---	---	---	---	0.00
2.21	0.036	543.21	0.00	0.00	---	---	0.00	---	---	---	---	0.00
2.52	0.044	543.52	0.00	0.00	---	---	0.00	---	---	---	---	0.00
2.84	0.052	543.84	0.00	0.00	---	---	0.00	---	---	---	---	0.00
3.15	0.062	544.15	0.11	0.00	---	---	0.00	---	---	---	---	0.11
3.47	0.072	544.47	1.00	0.00	---	---	0.00	---	---	---	---	1.00
3.78	0.083	544.78	2.52	0.00	---	---	0.00	---	---	---	---	2.52
4.10	0.095	545.10	4.30	0.00	---	---	0.00	---	---	---	---	4.30
4.41	0.108	545.41	5.66	0.00	---	---	0.00	---	---	---	---	5.66
4.73	0.122	545.73	6.73	0.07	---	---	0.00	---	---	---	---	6.80
5.04	0.137	546.04	7.66	0.75	---	---	0.00	---	---	---	---	8.41
5.36	0.153	546.36	8.49	1.88	---	---	0.00	---	---	---	---	10.37
5.67	0.170	546.67	9.24	2.85	---	---	0.00	---	---	---	---	12.10
5.99	0.188	546.99	9.94	3.56	---	---	0.00	---	---	---	---	13.50
6.30	0.207	547.30	10.59	4.14	---	---	8.54	---	---	---	---	23.28


Hyd. No. 3 - Reservoir - 1,000 Yr - Qp = 19.30 cfs - Econ. Ditch Outlet
Q cfs
20
15
10
5
0
0.0
152.8
305.6
458.4
611.2
764.0
916.8
1069.6
1222.4
1375.2
1528.0
Time (min)
Hyd. 2
Hyd. 3

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 4

Main Ash Pond Runoff

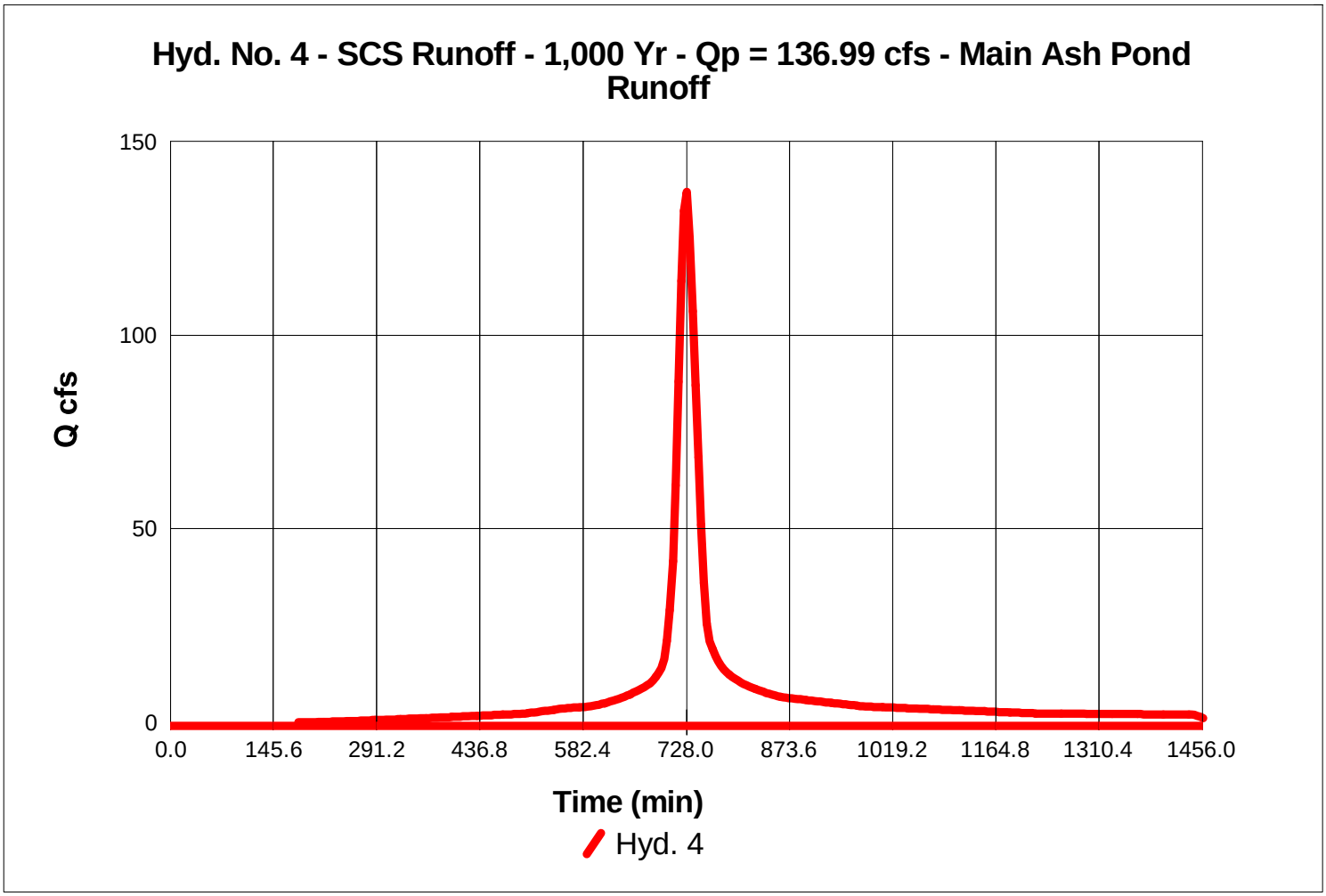
Hydrograph type	= SCS Runoff	Peak discharge	= 136.99 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Drainage area	= 17.00 ac	Curve number	= 85
Basin Slope	= 1.5 %	Hydraulic length	= 1250 ft
Tc method	= LAG	Time of conc. (Tc)	= 26.3 min
Total precip.	= 10.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 12.342 acft

Hydrograph Discharge Table

Time -- Outflow (min cfs)	
692	14.02
732	124.99
772	15.73

...End


Hyd. No. 4 - SCS Runoff - 1,000 Yr - Qp = 136.99 cfs - Main Ash Pond Runoff
Q cfs
150
100
50
0
0.0
145.6
291.2
436.8
582.4
728.0
873.6
1019.2
1164.8
1310.4
1456.0
Time (min)
Hyd. 4

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

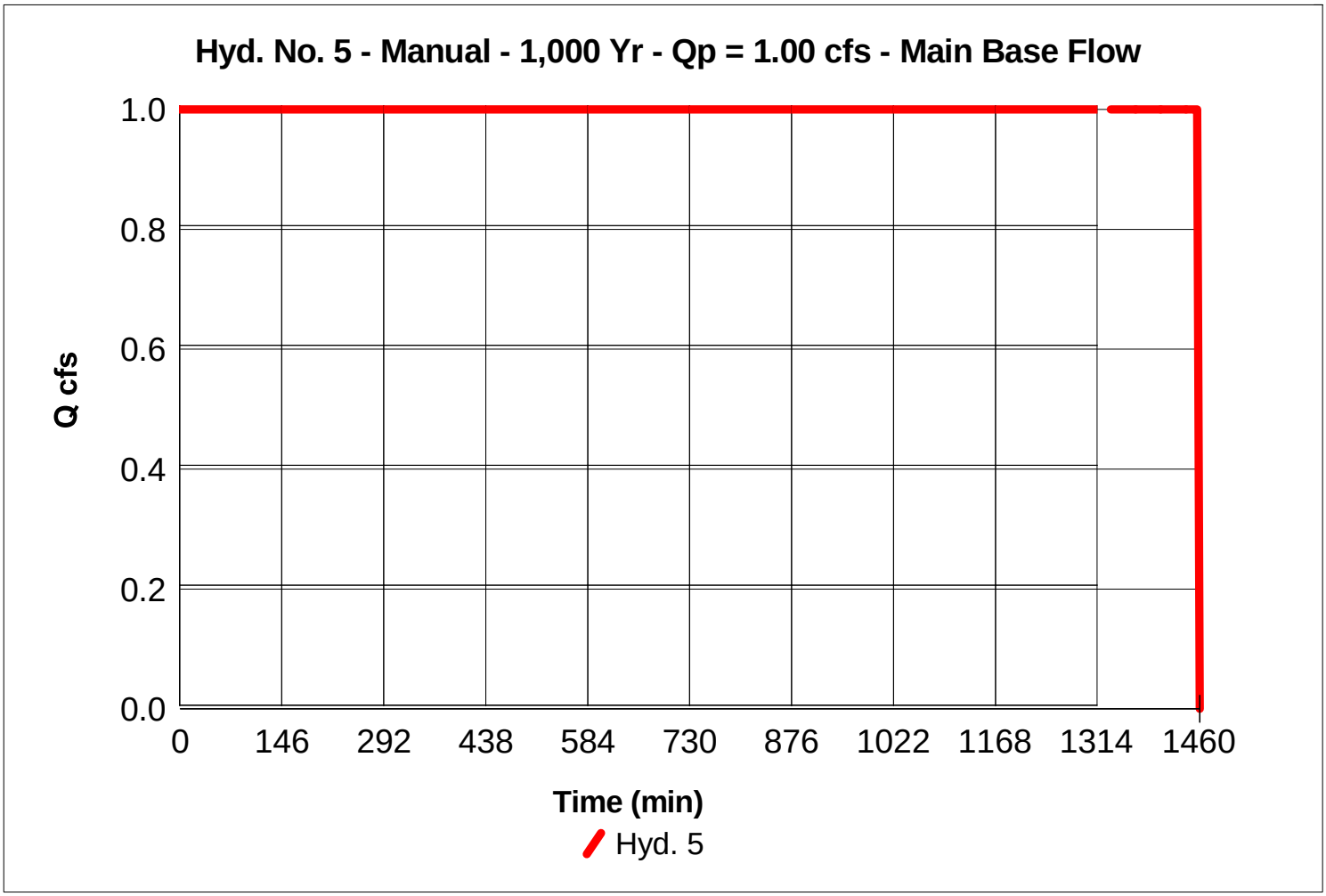
Main Base Flow

Hydrograph type	= Manual	Peak discharge	= 1.00 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min

Hydrograph Volume = 2.011 acft

Hydrograph Discharge Table

Time (min)	Outflow cfs)	Time (min)	Outflow cfs)
0	1.00 <<	1360	1.00 <<
40	1.00 <<	1400	1.00 <<
80	1.00 <<	1440	1.00 <<
120	1.00 <<		
160	1.00 <<		
200	1.00 <<	***...End***	
240	1.00 <<		
280	1.00 <<		
320	1.00 <<		
360	1.00 <<		
400	1.00 <<		
440	1.00 <<		
480	1.00 <<		
520	1.00 <<		
560	1.00 <<		
600	1.00 <<		
640	1.00 <<		
680	1.00 <<		
720	1.00 <<		
760	1.00 <<		
800	1.00 <<		
840	1.00 <<		
880	1.00 <<		
920	1.00 <<		
960	1.00 <<		
1000	1.00 <<		
1040	1.00 <<		
1080	1.00 <<		
1120	1.00 <<		
1160	1.00 <<		
1200	1.00 <<		
1240	1.00 <<		
1280	1.00 <<		
1320	1.00 <<		


Hyd. No. 5 - Manual - 1,000 Yr - Qp = 1.00 cfs - Main Base Flow
Q cfs
1.0
0.8
0.6
0.4
0.2
0.0
0
146
292
438
584
730
876
1022
1168
1314
1460
Time (min)
Hyd. 5

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

Main Ash Pond Inflow

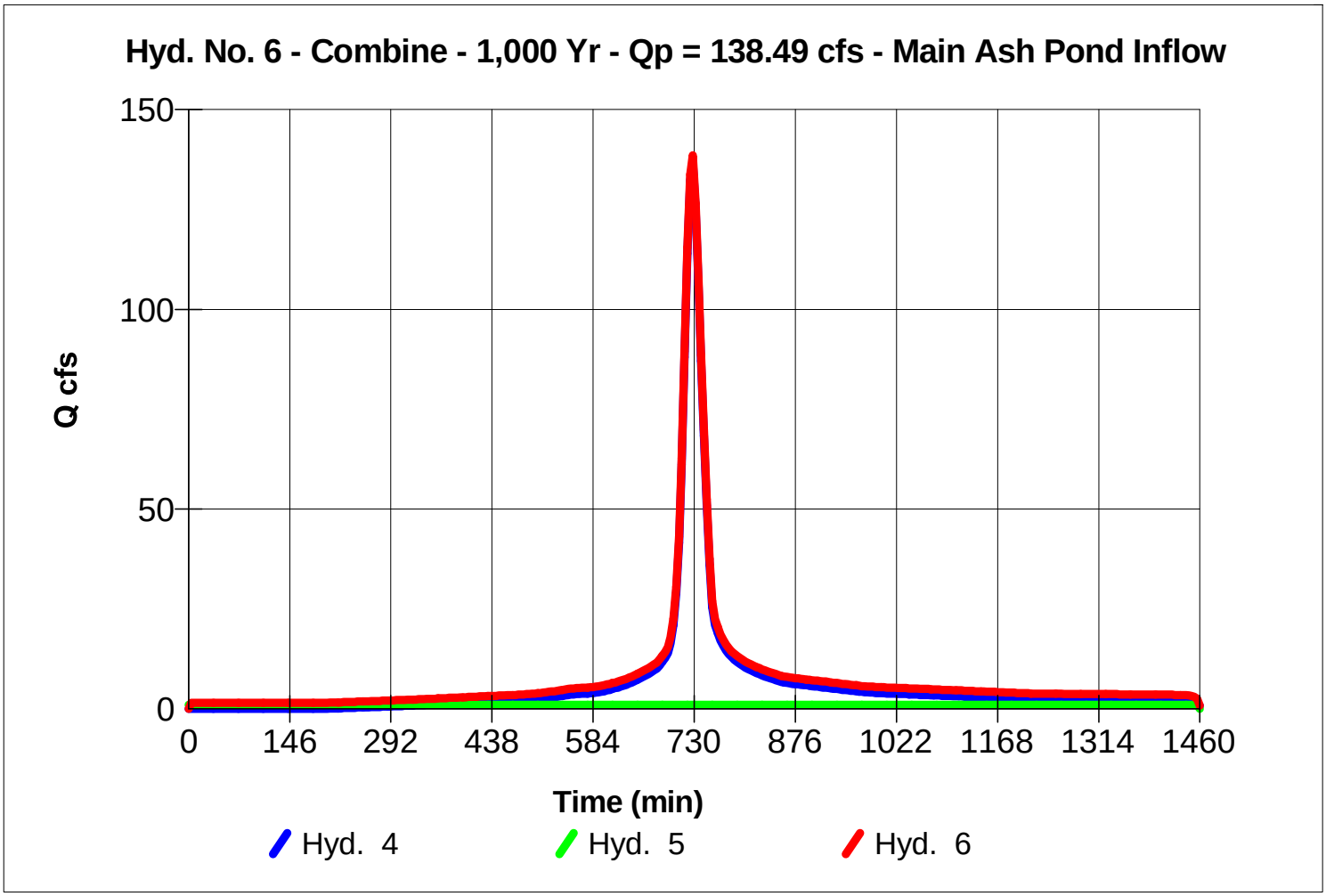
Hydrograph type	= Combine	Peak discharge	= 138.49 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Inflow hyds.	= 4, 5		

Hydrograph Volume = 15.359 acft

Hydrograph Discharge Table

Time (min)	Hyd. 4 + (cfs)	Hyd. 5 = (cfs)	Outflow (cfs)
720	113.94	1.00 <<	115.44
760	20.92	1.00 <<	22.42

...End


Hyd. No. 6 - Combine - 1,000 Yr - Qp = 138.49 cfs - Main Ash Pond Inflow
150
100
50
0
Q cfs
0
146
292
438
584
730
876
1022
1168
1314
1460
Time (min)
Hyd. 4
Hyd. 5
Hyd. 6

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

Main Ash Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 13.77 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Inflow hyd. No.	= 6	Reservoir name	= Main Ash Pond
Max. Elevation	= 533.38 ft	Max. Storage	= 6.277 acft

Storage Indication method used.

Outflow hydrograph volume = 15.350 acft

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
160	1.50	531.42	1.41	-----	-----	-----	-----	-----	-----	-----	-----	1.41
200	1.53	531.43	1.47	-----	-----	-----	-----	-----	-----	-----	-----	1.47
240	1.76	531.45	1.59	-----	-----	-----	-----	-----	-----	-----	-----	1.59
280	2.01	531.47	1.79	-----	-----	-----	-----	-----	-----	-----	-----	1.79
320	2.29	531.50	2.04	-----	-----	-----	-----	-----	-----	-----	-----	2.04
360	2.59	531.53	2.32	-----	-----	-----	-----	-----	-----	-----	-----	2.32
400	2.91	531.57	2.64	-----	-----	-----	-----	-----	-----	-----	-----	2.64
440	3.24	531.60	2.96	-----	-----	-----	-----	-----	-----	-----	-----	2.96
480	3.57	531.64	3.29	-----	-----	-----	-----	-----	-----	-----	-----	3.29
520	4.24	531.68	3.73	-----	-----	-----	-----	-----	-----	-----	-----	3.73
560	5.17	531.76	4.50	-----	-----	-----	-----	-----	-----	-----	-----	4.50
600	5.93	531.83	5.23	-----	-----	-----	-----	-----	-----	-----	-----	5.23
640	8.09	531.96	6.53	-----	-----	-----	-----	-----	-----	-----	-----	6.53
680	12.40	532.05	7.25	-----	-----	-----	-----	-----	-----	-----	-----	7.25
720	115.44	532.59	9.89	-----	-----	-----	-----	-----	-----	-----	-----	9.89
760	22.42	533.36	13.69	-----	-----	-----	-----	-----	-----	-----	-----	13.69
800	12.25	533.38	13.76	-----	-----	-----	-----	-----	-----	-----	-----	13.76
840	9.08	533.36	13.66	-----	-----	-----	-----	-----	-----	-----	-----	13.66
880	7.57	533.32	13.49	-----	-----	-----	-----	-----	-----	-----	-----	13.49
920	6.76	533.27	13.30	-----	-----	-----	-----	-----	-----	-----	-----	13.30
960	5.94	533.22	13.08	-----	-----	-----	-----	-----	-----	-----	-----	13.08
1000	5.41	533.17	12.84	-----	-----	-----	-----	-----	-----	-----	-----	12.84
1040	5.12	533.12	12.59	-----	-----	-----	-----	-----	-----	-----	-----	12.59
1080	4.82	533.06	12.34	-----	-----	-----	-----	-----	-----	-----	-----	12.34
1120	4.53	533.01	12.08	-----	-----	-----	-----	-----	-----	-----	-----	12.08
1160	4.24	532.88	11.45	-----	-----	-----	-----	-----	-----	-----	-----	11.45
1200	3.94	532.75	10.77	-----	-----	-----	-----	-----	-----	-----	-----	10.77
1240	3.78	532.63	10.09	-----	-----	-----	-----	-----	-----	-----	-----	10.09
1280	3.72	532.52	9.43	-----	-----	-----	-----	-----	-----	-----	-----	9.43
1320	3.66	532.42	8.79	-----	-----	-----	-----	-----	-----	-----	-----	8.79
1360	3.60	532.32	8.62	-----	-----	-----	-----	-----	-----	-----	-----	8.62
1400	3.54	532.23	8.39	-----	-----	-----	-----	-----	-----	-----	-----	8.39
1440	3.48	532.14	7.94	-----	-----	-----	-----	-----	-----	-----	-----	7.94
1480	0.00	532.03	7.11	-----	-----	-----	-----	-----	-----	-----	-----	7.11
1520	0.00	531.58	2.77	-----	-----	-----	-----	-----	-----	-----	-----	2.77

...End

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 3 - Main Ash Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	531.10	15,000	0.000	0.000
0.90	532.00	24,000	0.403	0.403
1.90	533.00	235,000	2.973	3.376
2.90	534.00	427,000	7.599	10.975

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 15.0	0.0	0.0	0.0
Span in	= 15.0	0.0	0.0	0.0
No. Barrels	= 2	0	0	0
Invert El. ft	= 531.10	0.00	0.00	0.00
Length ft	= 60.0	0.0	0.0	0.0
Slope %	= 1.00	0.00	0.00	0.00
N-Value	= .015	.000	.000	.000
Orif. Coeff.	= 0.86	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

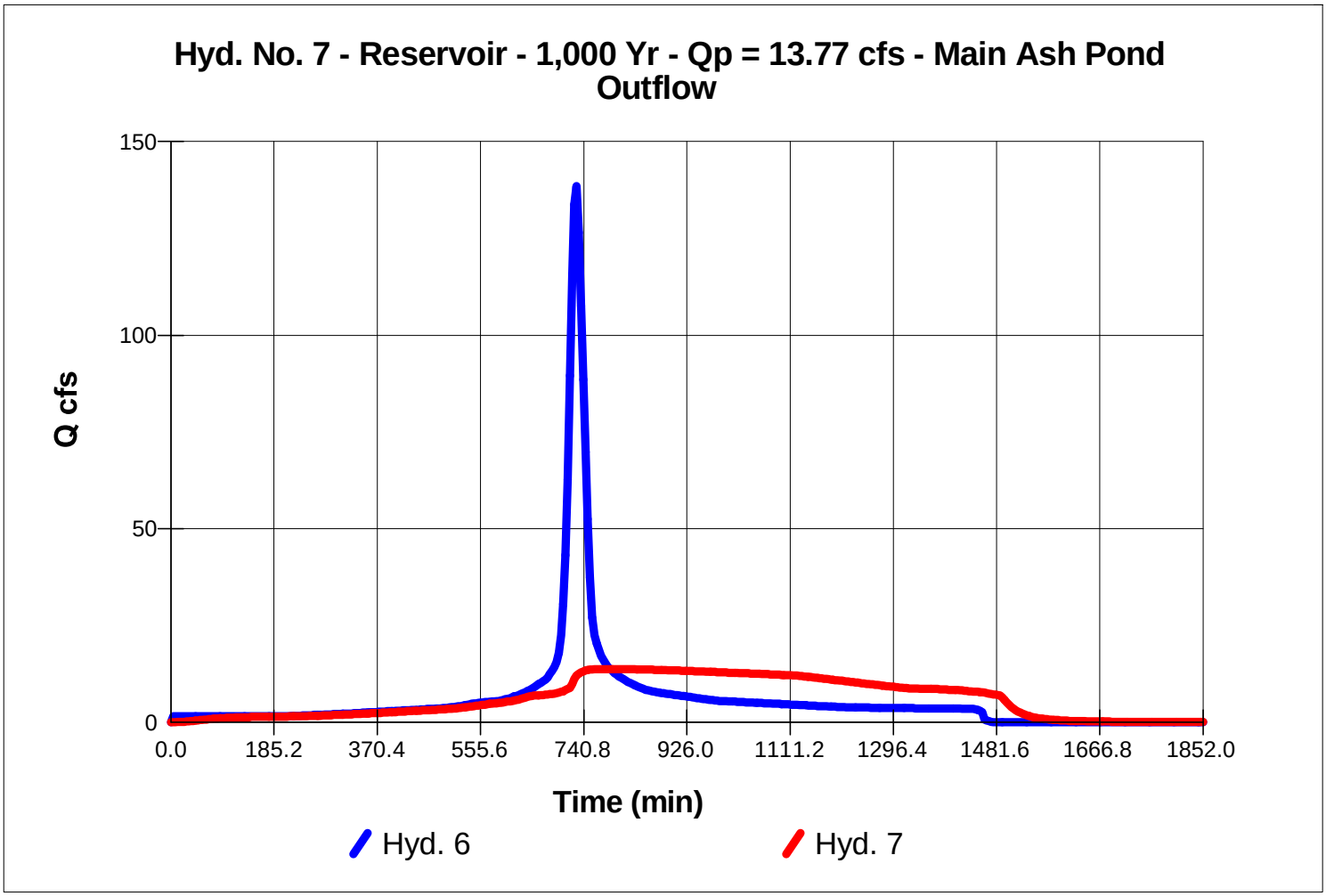
	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	531.10	0.00	---	---	---	---	---	---	---	---	0.00
0.90	0.403	532.00	6.85	---	---	---	---	---	---	---	---	6.85
1.90	3.376	533.00	12.05	---	---	---	---	---	---	---	---	12.05
2.90	10.975	534.00	16.17	---	---	---	---	---	---	---	---	16.17


Hyd. No. 7 - Reservoir - 1,000 Yr - Qp = 13.77 cfs - Main Ash Pond Outflow
Q cfs
150
100
50
0
0.0
185.2
370.4
555.6
740.8
926.0
1111.2
1296.4
1481.6
1666.8
1852.0
Time (min)
Hyd. 6
Hyd. 7

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 8

Economizer Area Runoff

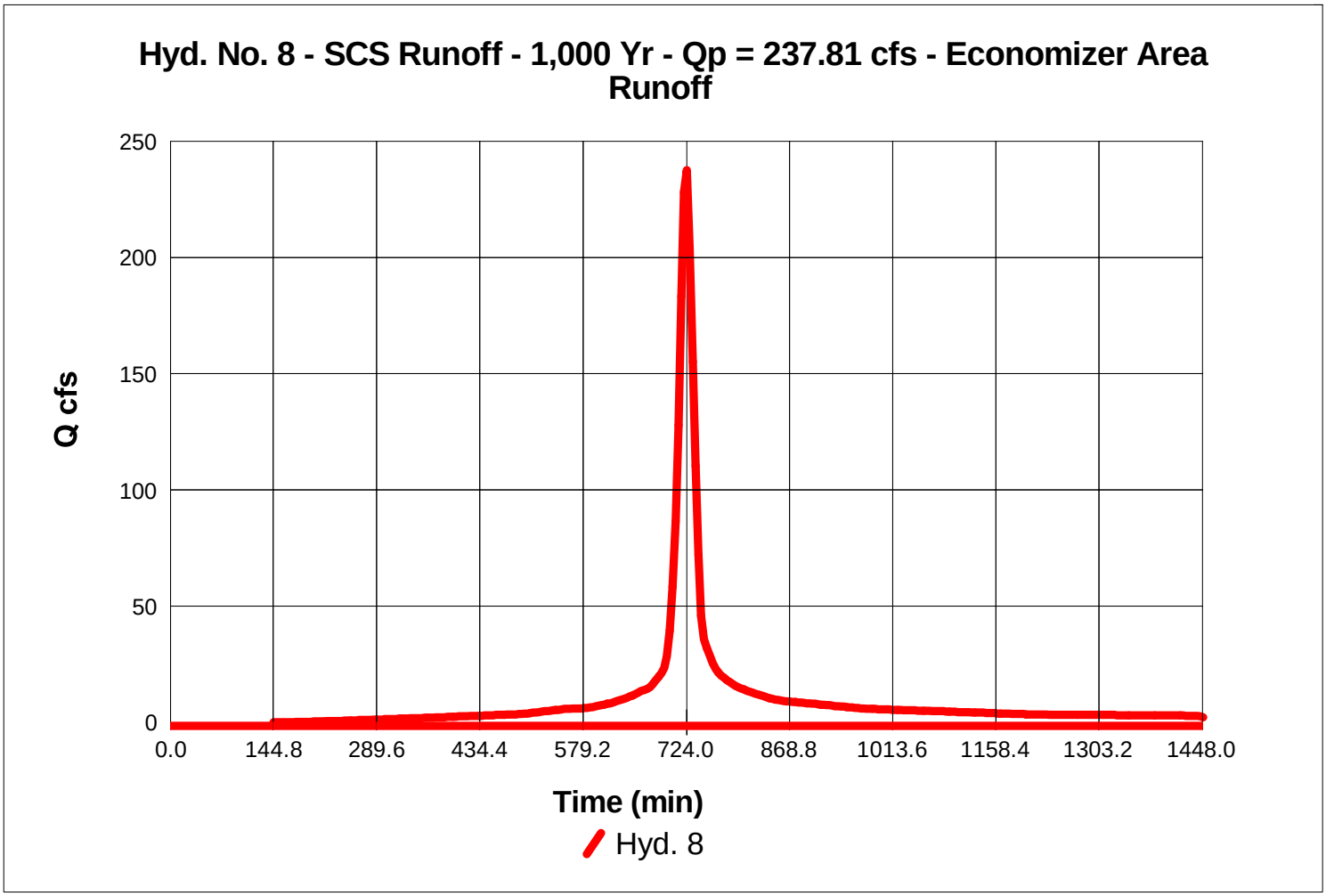
Hydrograph type	= SCS Runoff	Peak discharge	= 237.81 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Drainage area	= 25.00 ac	Curve number	= 87
Basin Slope	= 1.0 %	Hydraulic length	= 700 ft
Tc method	= LAG	Time of conc. (Tc)	= 18.8 min
Total precip.	= 10.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 18.127 acft

Hydrograph Discharge Table

Time -- Outflow (min cfs)	
696	28.55
736	110.20

...End


Hyd. No. 8 - SCS Runoff - 1,000 Yr - Qp = 237.81 cfs - Economizer Area Runoff
Q cfs
250
200
150
100
50
0
0.0
144.8
289.6
434.4
579.2
724.0
868.8
1013.6
1158.4
1303.2
1448.0
Time (min)
Hyd. 8

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Upper Ash Pond Inflow

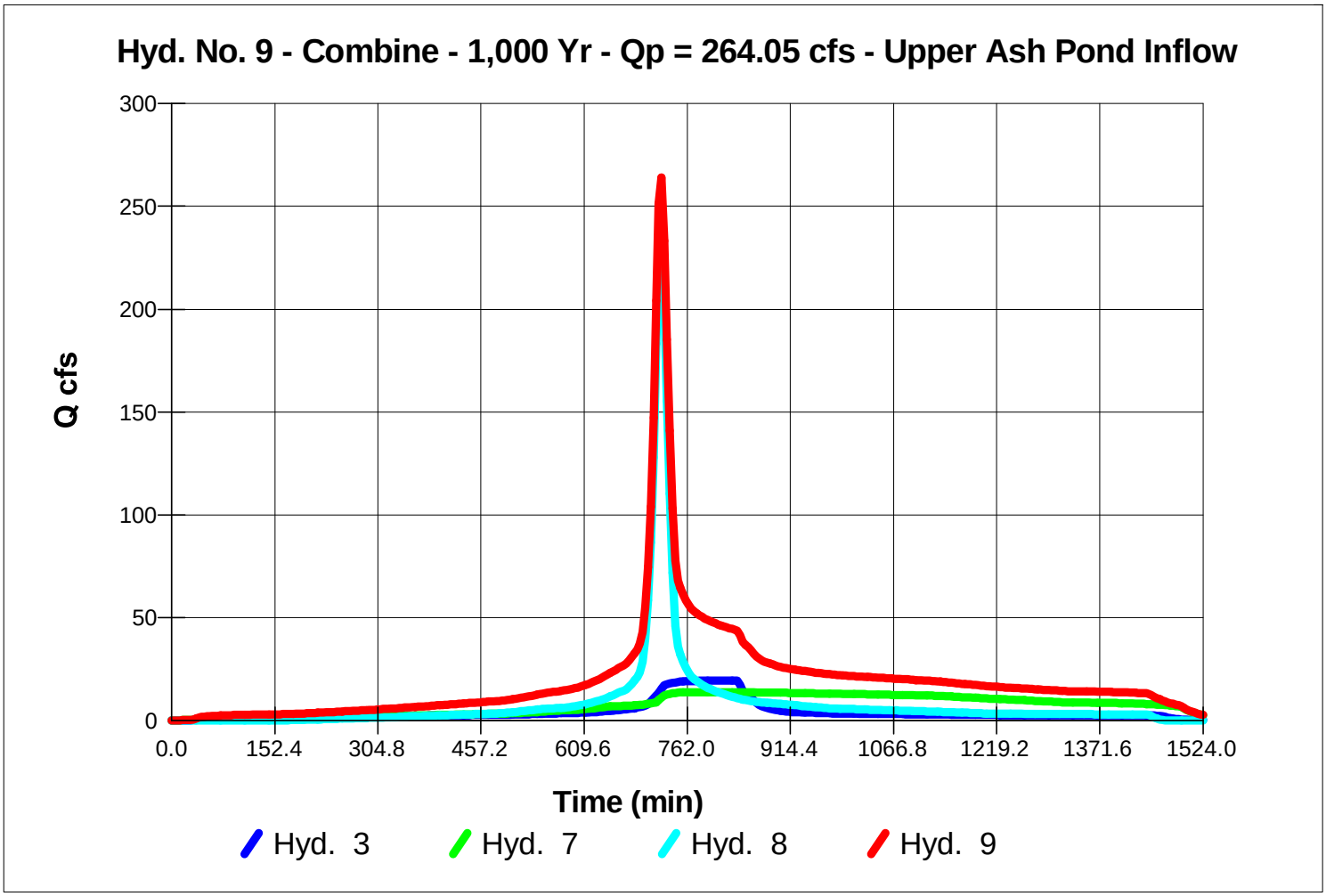
Hydrograph type	= Combine	Peak discharge	= 264.05 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Inflow hyds.	= 3, 7, 8		

Hydrograph Volume = 42.192 acft

Hydrograph Discharge Table

Time (min)	Hyd. 3 + (cfs)	Hyd. 7 + (cfs)	Hyd. 8 = (cfs)	Outflow (cfs)
680	5.73	7.25	17.85	30.83
720	13.18	9.89	228.18	251.26
760	18.99	13.69	25.55	58.23
800	19.28	13.76	14.61	47.64
840	17.27	13.66	10.44	41.37
880	6.03	13.49	8.58	28.10

...End


Hyd. No. 9 - Combine - 1,000 Yr - Qp = 264.05 cfs - Upper Ash Pond Inflow
Q cfs
300
250
200
150
100
50
0
0.0
152.4
304.8
457.2
609.6
762.0
914.4
1066.8
1219.2
1371.6
1524.0
Time (min)
Hyd. 3
Hyd. 7
Hyd. 8
Hyd. 9

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 10

Upper Ash Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 9.40 cfs
Storm frequency	= 1,000 yrs	Time interval	= 4 min
Inflow hyd. No.	= 9	Reservoir name	= Upper Ash Pond
Max. Elevation	= 530.27 ft	Max. Storage	= 30.156 acft

Storage Indication method used.

Outflow hydrograph volume = 42.022 acft

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
240	4.10	528.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.94
280	4.83	528.03	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.20
320	5.66	528.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.49
360	6.54	528.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.81
400	7.47	528.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.04
440	8.42	528.15	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.31
480	9.38	528.17	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.60
520	11.16	528.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.94
560	13.70	528.24	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.36
600	15.99	528.29	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.86
640	21.48	528.35	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.56
680	30.83	528.43	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.58
720	251.26	528.77	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.68
760	58.23	529.29	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.26
800	47.64	529.47	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.45
840	41.37	529.63	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.62
880	28.10	529.73	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.73
920	24.74	529.80	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.82
960	22.88	529.86	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.90
1000	21.68	529.92	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.96
1040	20.86	529.97	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.03
1080	20.05	530.01	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.09
1120	19.24	530.06	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.14
1160	18.06	530.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.19
1200	16.83	530.13	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.23
1240	15.86	530.16	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.27
1280	15.08	530.19	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.30
1320	14.32	530.21	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.32
1360	14.05	530.23	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.35
1400	13.71	530.25	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.37
1440	13.15	530.26	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.39
1480	8.01	530.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.40
1520	2.90	530.25	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.38
1560	1.03	530.22	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.34
1600	0.49	530.18	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.30
1640	0.30	530.15	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.25
1680	0.19	530.11	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.21
1720	0.12	530.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.16

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1760	0.10	530.04	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.11
1800	0.09	530.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.07
1840	0.07	529.96	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.02
1880	0.06	529.92	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.98
1920	0.05	529.89	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.93
1960	0.05	529.85	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.89
2000	0.04	529.81	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.84
2040	0.03	529.78	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.80
2080	0.03	529.74	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.75
2120	0.02	529.71	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.71
2160	0.02	529.67	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.67
2200	0.02	529.63	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.63
2240	0.02	529.60	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.59
2280	0.01	529.56	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.55
2320	0.01	529.53	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.51
2360	0.01	529.49	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.47
2400	0.01	529.46	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.43
2440	0.01	529.42	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.40
2480	0.01	529.39	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.36
2520	0.01	529.35	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.32
2560	0.00	529.32	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.28
2600	0.00	529.28	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.25
2640	0.00	529.25	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.21
2680	0.00	529.22	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.17
2720	0.00	529.18	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.14
2760	0.00	529.15	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.10
2800	0.00	529.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.06
2840	0.00	529.08	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.03
2880	0.00	529.05	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.99
2920	0.00	529.02	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.95
2960	0.00	528.98	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.92
3000	0.00	528.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.88
3040	0.00	528.92	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.85
3080	0.00	528.88	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.81
3120	0.00	528.85	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.78
3160	0.00	528.82	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.74
3200	0.00	528.79	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.71
3240	0.00	528.76	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.67
3280	0.00	528.73	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.64
3320	0.00	528.69	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.60
3360	0.00	528.66	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.57
3400	0.00	528.63	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.53
3440	0.00	528.60	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.49
3480	0.00	528.57	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.16
3520	0.00	528.54	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.84
3560	0.00	528.51	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.54
3600	0.00	528.49	-----	-----	-----	-----	-----	-----	-----	-----	-----	6.23
3640	0.00	528.46	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.93
3680	0.00	528.44	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.64
3720	0.00	528.41	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.37
3760	0.00	528.39	-----	-----	-----	-----	-----	-----	-----	-----	-----	5.11

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
3800	0.00	528.37	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.86
3840	0.00	528.35	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.62
3880	0.00	528.33	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.40
3920	0.00	528.32	-----	-----	-----	-----	-----	-----	-----	-----	-----	4.19
3960	0.00	528.30	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.98
4000	0.00	528.28	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.81
4040	0.00	528.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.64
4080	0.00	528.25	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.47
4120	0.00	528.24	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.32
4160	0.00	528.22	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.17
4200	0.00	528.21	-----	-----	-----	-----	-----	-----	-----	-----	-----	3.03
4240	0.00	528.20	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.90
4280	0.00	528.19	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.77
4320	0.00	528.18	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.64
4360	0.00	528.17	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.53
4400	0.00	528.16	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.41
4440	0.00	528.15	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.30
4480	0.00	528.14	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.20
4520	0.00	528.13	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.10
4560	0.00	528.12	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.01
4600	0.00	528.11	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.92
4640	0.00	528.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.84
4680	0.00	528.09	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.72
4720	0.00	528.08	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.60
4760	0.00	528.07	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.49
4800	0.00	528.05	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.38
4840	0.00	528.04	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.28
4880	0.00	528.03	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.19
4920	0.00	528.02	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.10
4960	0.00	528.01	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.02
5000	0.00	528.01	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.95

...End

Reservoir Report

Reservoir No. 2 - Upper Ash Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	527.90	00	0.000	0.000
0.20	528.10	579,000	1.329	1.329
0.40	528.30	579,000	2.658	3.988
0.60	528.50	579,000	2.658	6.646
0.70	528.60	579,000	1.329	7.975
1.80	529.70	579,000	14.621	22.596
3.10	531.00	579,000	17.280	39.876
4.00	531.90	579,000	11.963	51.839

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

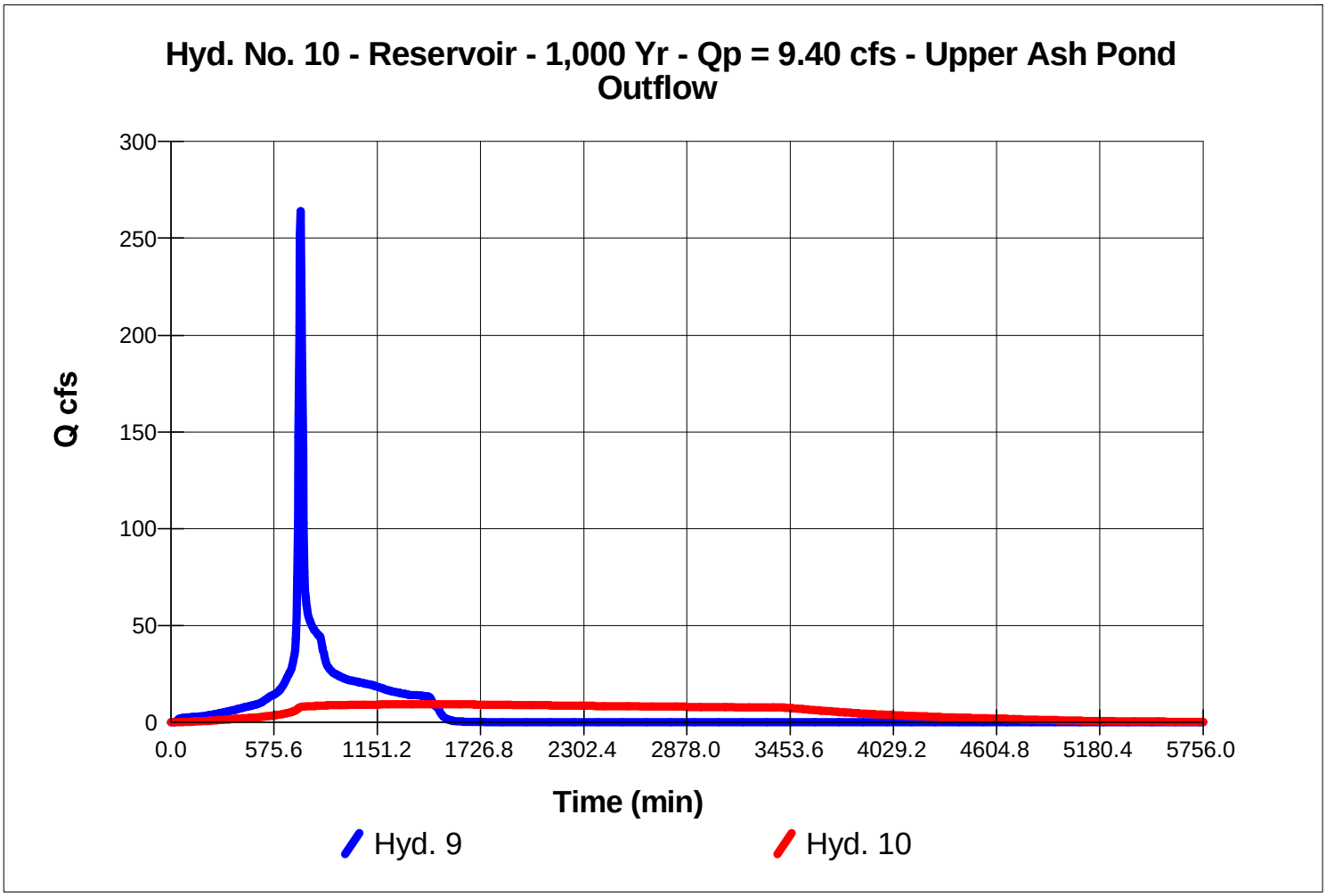
	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	527.90	---	---	---	---	---	---	---	---	---	0.00
0.20	1.329	528.10	---	---	---	---	---	---	---	---	---	1.80
0.40	3.988	528.30	---	---	---	---	---	---	---	---	---	4.00
0.60	6.646	528.50	---	---	---	---	---	---	---	---	---	6.40
0.70	7.975	528.60	---	---	---	---	---	---	---	---	---	7.50
1.80	22.596	529.70	---	---	---	---	---	---	---	---	---	8.70
3.10	39.876	531.00	---	---	---	---	---	---	---	---	---	10.30
4.00	51.839	531.90	---	---	---	---	---	---	---	---	---	11.00


Hyd. No. 10 - Reservoir - 1,000 Yr - Qp = 9.40 cfs - Upper Ash Pond Outflow
Q cfs
300
250
200
150
100
50
0
0.0
575.6
1151.2
1726.8
2302.4
2878.0
3453.6
4029.2
4604.8
5180.4
5756.0
Time (min)
Hyd. 9
Hyd. 10