Run-on and Run-off Control System Plan

Landfill
Flint Creek Plant

Prepared for:
America Electric Power
1 Riverside Plaza
Columbus, Ohio 43215

Prepared by:
Verdantas
219 South Erie Street
Toledo, OH 43604
419-385-2018

Verdantas Project No: 45142

October 2, 2026

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1. Introduction

This Run-on and Run-off Control System Plan (Plan) 5-year update has been prepared for the Flint Creek Power Plant Landfill (Landfill) in Gentry, Arkansas, to comply with the requirements of Federal Regulation Title 40, Subpart §257.81. The Landfill is currently being operated under a Class 3 Non-Commercial Landfill permit modification issued by the Arkansas Department of Environmental Quality (ADEQ) on December 17, 2014 (permit 0273-S3N-R2).

Federal Regulation Title 40, Subpart §257.81 states that the Owner or Operator of an existing or new coal combustion residual (CCR) landfill or any lateral expansion of a CCR landfill must comply with the following:

a. Design, construct, operate, and maintain:

    1. A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and

    2. A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

b. Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under § 257.3-3.

c. Prepare a Run-on and Run-off Control System Plan for existing CCR landfills according to the following timelines:

    1. The initial run-on and run-off control system plan no later than October 17, 2016.

    2. Periodic run-on and run-off control system plans (from the date of the initial Plan) are placed in the Landfill's Operating Record every five years.

d. Obtain a certification from a qualified professional engineer stating that the initial and periodic run-on and run-off control system plans meet the requirements of §257.81.

e. Comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

This Plan represents the 5-year revision of the original September 2016 Plan (last updated and revised in September 2021), as required by § 257.81(c)(4), and is in general compliance with the requirements listed above. The design of the run-on and run-off control measures were completed as part of the current permit for the Landfill, which was obtained after submittal of the Intermediate Liner and Leachate Collection System Permit Modification application, dated March 2011 (Permit Modification). The Landfill manages, installs and maintains the run-on and run-off controls shown on Figure 2 in Appendix A.

2. Run-on Controls

The Preamble from Subpart 257 of CFR 40 defines run-on as “any liquid that drains over land onto any part of a CCR landfill or any lateral expansion of a CCR landfill.” In surface water hydrology, run-on is a quantity of surface run-off, or excess rain, snowmelt, or other sources of water, which flows from an upstream catchment area onto a specific downstream location. This section of this Plan describes the controls at the Landfill to manage run-on from outside the Landfill footprint and from inside the Landfill footprint, which are designed to manage the peak flow from a 24-hour, 25-year storm event.

2.1 Run-on Controls from Outside the Landfill Footprint

The Landfill is located in an area with gentle slopes that generally drain from northeast to southwest. Figures 1 and 2 in Appendix A shows the layout of the Landfill, surrounding topography, and the run-on controls.

Perimeter ditches are located along the north and west sides of the Landfill to collect run-on and keep it away from the Landfill. Run-on that is collected by these ditches (north ditch and upstream portion of west ditch) is conveyed to either the West Sediment Basin or to stormwater culverts under Swepco Road at the southwest corner of the Landfill, which ultimately discharge to the Wastewater Pond located southwest of the Landfill. Design calculations for the perimeter ditches are provided in the Permit Modification.

An existing intermittent stream located east of the Landfill collects run-on from the east and conveys it to stormwater culverts under Swepco Road at the southeast corner of the Landfill, which ultimately discharge to the Wastewater Ash Pond. The portion between the east side of the Landfill and the perennial stream, as well as the south side of the Landfill, slope away from the Landfill, thus not generating run-on to the Landfill.

2.2 Run-on Controls from Inside the Landfill Footprint

The Landfill, since obtaining approval from ADEQ for the Permit Modification in December 2014, is being developed in phases. Beginning in July 2016, the Landfill was regraded to improve surface water drainage and through a series of construction events either installed final cover in areas that had reached final permitted grades (i.e. on the outer 4:1 side slopes) or constructed an Intermediate Liner System (i.e. on the center portion of the landfill that will receive waste during the remainder of the landfill’s active life).

Currently, disposal operations are occurring in the northern half of the central portion of the Landfill. Run-on from areas at higher elevations and outside the active disposal area (i.e., southern half of the central portion of the landfill) will be diverted from the disposal area by grading those areas to promote positive drainage to the exterior slopes, where perimeter channels safely convey stormwater to either the North or West Sediment Basins. The exterior slopes have either received final cover or have temporary cover with established vegetation.

3. Run-off Controls

3.1 Run-off Controls From Temporary and Final Cover System

The Landfill's temporary and final cover systems have been designed to minimize infiltration of precipitation into the Landfill, thus minimizing contact water and leachate generation. The surface of both cover systems is vegetated to minimize erosion of cover soils. In areas of final cover, a subsurface drainage system (i.e., a double-sided geocomposite drainage net) exists to collect and convey stormwater that infiltrates through the vegetative cover soils. Stormwater from both the temporary and final cover systems flows away from the active filling area and discharges to perimeter ditches and diversion berms via erosion control terraces and letdowns. The majority of the run-off from the cover systems is conveyed to either the North or West Sediment Basins. The small portions that are not conveyed to the Sediment Basins are conveyed directly to the stormwater culverts under Swepco Road on the southwest and southeast corners of the Landfill. All stormwater run-off is ultimately discharged to the Wastewater Pond. Details and design calculations for the run-off controls are provided in the Permit Modification.

3.2 Run-off Controls for Contact Water Management System

Run-off generated within the active filling area will be managed as contact water and conveyed to the Contact Water Pond located southwest of the Landfill. As waste is placed in the active filling area, the outer 4:1 slopes will be covered in accordance with the permit to minimize contact water generation. Filling operations will occur in such way that the inner grades of the Landfill will be sloped for contact water to gravity-drain towards the Contact Water Pond inlet channels located on the southwest corner of the Landfill, and will ultimately discharge to the Contact Water Pond. Details and design calculations for the run-off controls are provided in the Permit Modification. Perimeter berms on the north, east, and west side of the active area will also be maintained to ensure contact water is contained and directed towards the existing contact water pipe and inlet channels. Support calculations for these berms are provided in Appendix B-I.

Additionally, an interim contact water pipe was installed which provides gravity flow of contact water from within Area 2 to the northern concrete inlet channel of the Contact Water Pond. The design of the interim contact water pipe is consistent with the maximum contact water design flow established in the Permit Modification. Appendix B-II contains calculations for the interim contact water pipe.

3.3 Leachate Collection and Management System

Leachate from the Landfill is collected via a 1.5-foot (minimum thickness) bottom ash drainage layer and perforated collection pipes, which all drain to the southwest corner of the Landfill, at which point the leachate pipe becomes solid and conveys leachate from the Landfill to the Leachate Pond. An on-site treatment system treats the Landfill's leachate prior to discharging it

into the Contact Water Pond. The existing Area 1 and 2 leachate collection pipes and are shown on Figures 2.

4. Plan Amendments and Revisions

In accordance with §257.81(c)(2), this Plan may be amended at any time, if desired by the owner or operator of the Landfill or if there is a change in conditions that substantially affect the written plan in effect (e.g., changes in the Landfill design, construction, operation, and/or maintenance). In such cases, amendments shall be made to the written plan and placed in the Landfill's operating record.

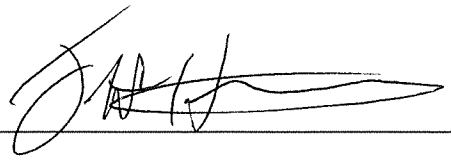
In accordance with §257.81(c)(4), the owner or operator must prepare periodic run-on and run-off control system plans every five years, at a minimum. This Plan represents the 5-year revision of the original September 2016 Plan (last revised September 2021), as required by § 257.81(c)(4). The original plan was placed in the Landfill's operating record on October 16, 2016.

All amendments resulting from changes in in the Landfill design, construction, operation, and/or maintenance shall be reviewed and certified by a qualified professional engineer in accordance with Section 5.0 of this Plan. All scheduled reviews and amended plans shall be recorded in the Plan Review Log provided in Appendix C. The five-year reviews shall be recorded even if no changes are made to the Plan as a result of the review.

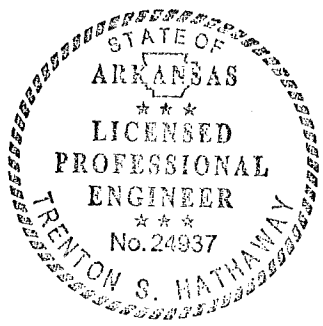
5. Professional Engineer Certification

The original plan and all reviews and amended plans must obtain certification from a qualified professional engineer stating that the initial and periodic run-on and run-off control system plans meet the requirements of §257.

The undersigned licensed Professional Engineer (P.E.) certifies that this Run-on and Run-off Control Plan has been prepared, reviewed, and/or revised in accordance with the current requirements of Federal Regulation Title 40, Subpart §257.81, including consideration of good engineering practice and industry standards. This certification in no way relieves the owner or operator of the Landfill of his/her duty to fully implement this Plan.

Signature 

Seal



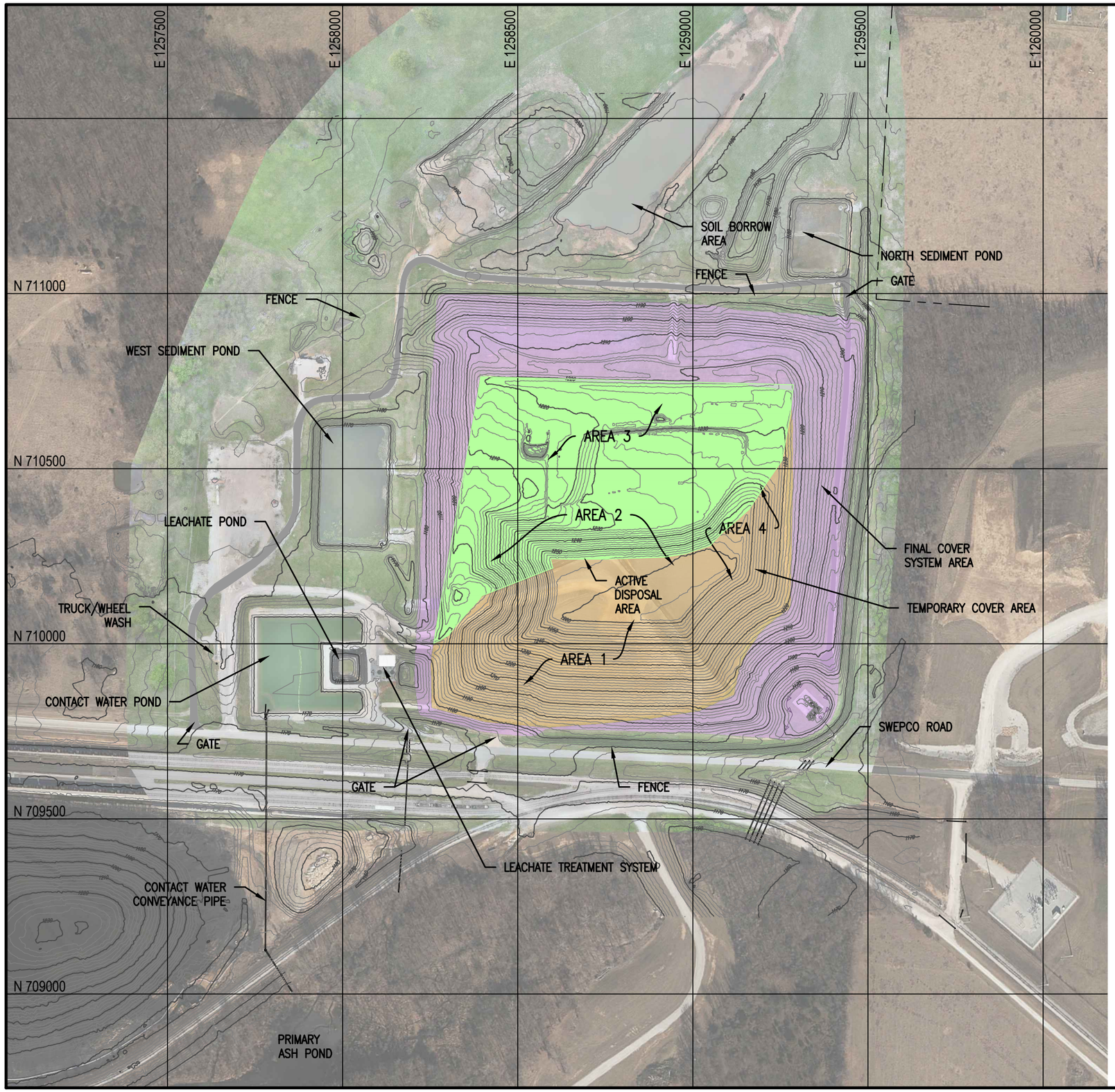
Name Trenton S. Hathaway

Registration Number 24937

State Arkansas

Date 10/2/2026

Appendix A:
Figures



N

0 150' 300'

DRAWING SCALE

LEGEND

- PROPERTY BOUNDARY
- INDEX CONTOUR (1210)
- INTERMEDIATE CONTOUR
- CULVERT
- APPROXIMATE LIMIT OF TEMPORARY COVER
- APPROXIMATE LIMIT OF THE FINAL COVER SYSTEM
- APPROXIMATE LIMIT OF THE ACTIVE DISPOSAL ARA

NOTES:

1. AERIAL TOPOGRAPHY SHOWN PROVIDED BY AMERICAN ELECTRIC POWER AND IS DATED FEBRUARY 2026. HORIZONTAL DATUM: NAD27 AR-N. VERTICAL DATUM: NGVD29.

verdantas
219 SOUTH ERIE STREET
TOLEDO, OH 43604
TEL. 419-385-2018

DESIGNED BY	DRAWN BY	CHECKED BY	PROJECT NO.
SAS	JRS	CLF	45142

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FLINT CREEK POWER PLANT LANDFILL

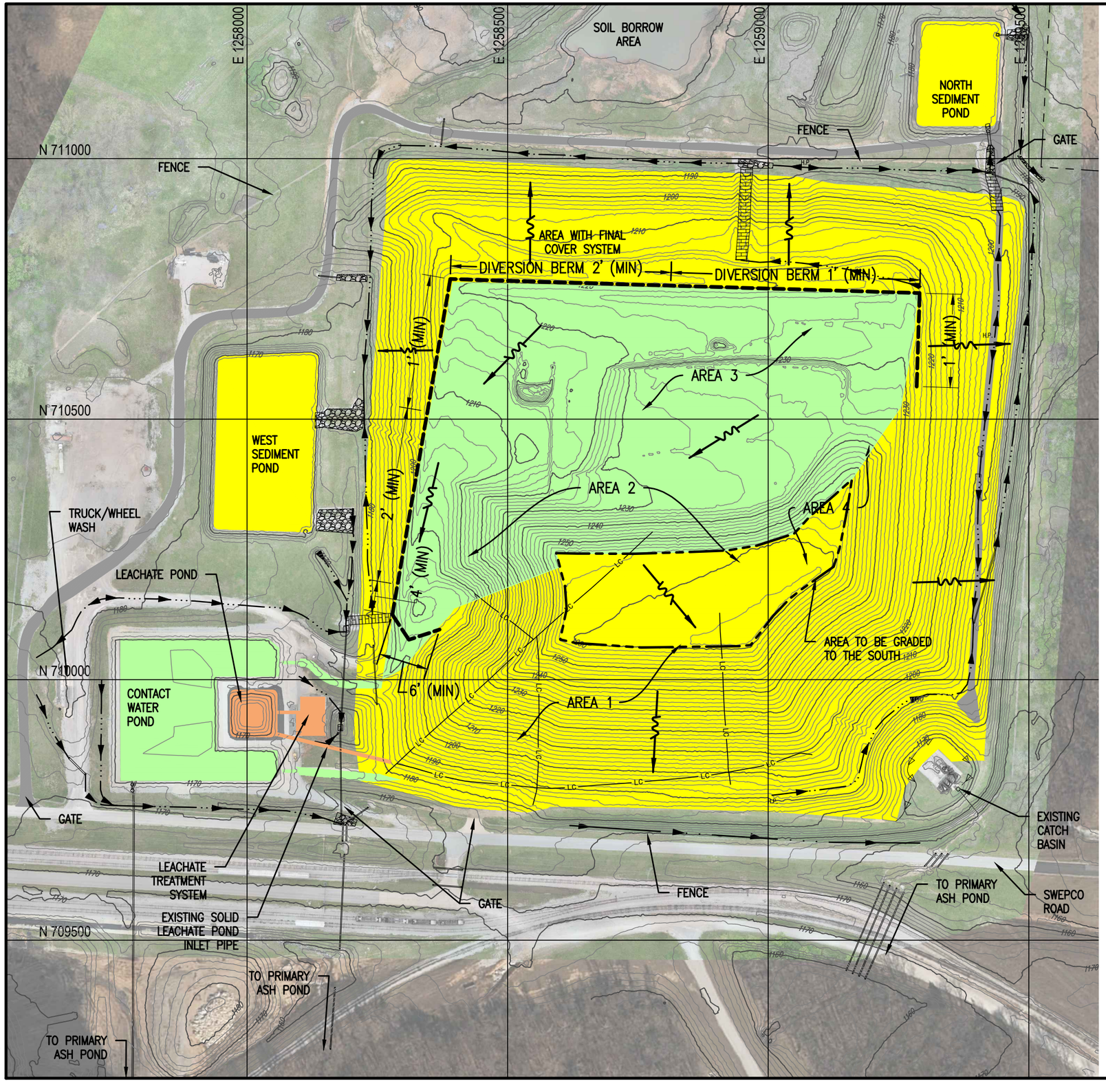
FIGURE 1 - GENERAL SITE PLAN

DATE 9/29/2026

SCALE AS NOTED

SHEET 1

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0 100' 200'
DRAWING SCALE

LEGEND

- PROPERTY BOUNDARY
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- CONTACT WATER
- STORMWATER RUN-OFF
- LEACHATE MANAGEMENT COMPONENTS
- STORMWATER FLOW
- GENERAL FLOW DIRECTION
- EXISTING PERFORATED LEACHATE COLLECTION PIPE
- DIVERSION BERM
- LIMITS OF STORMWATER GRADING IMPROVEMENT

NOTE:

1. AERIAL TOPOGRAPHY SHOWN PROVIDED BY AMERICAN ELECTRIC POWER AND IS DATED FEBRUARY 2026. HORIZONTAL DATUM: NAD27 AR-N. VERTICAL DATUM: NGVD29.

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FLINT CREEK POWER PLANT LANDFILL

FIGURE 2 - RUN-ON AND RUN-OFF CONTROL PLAN

DATE 9/30/2026

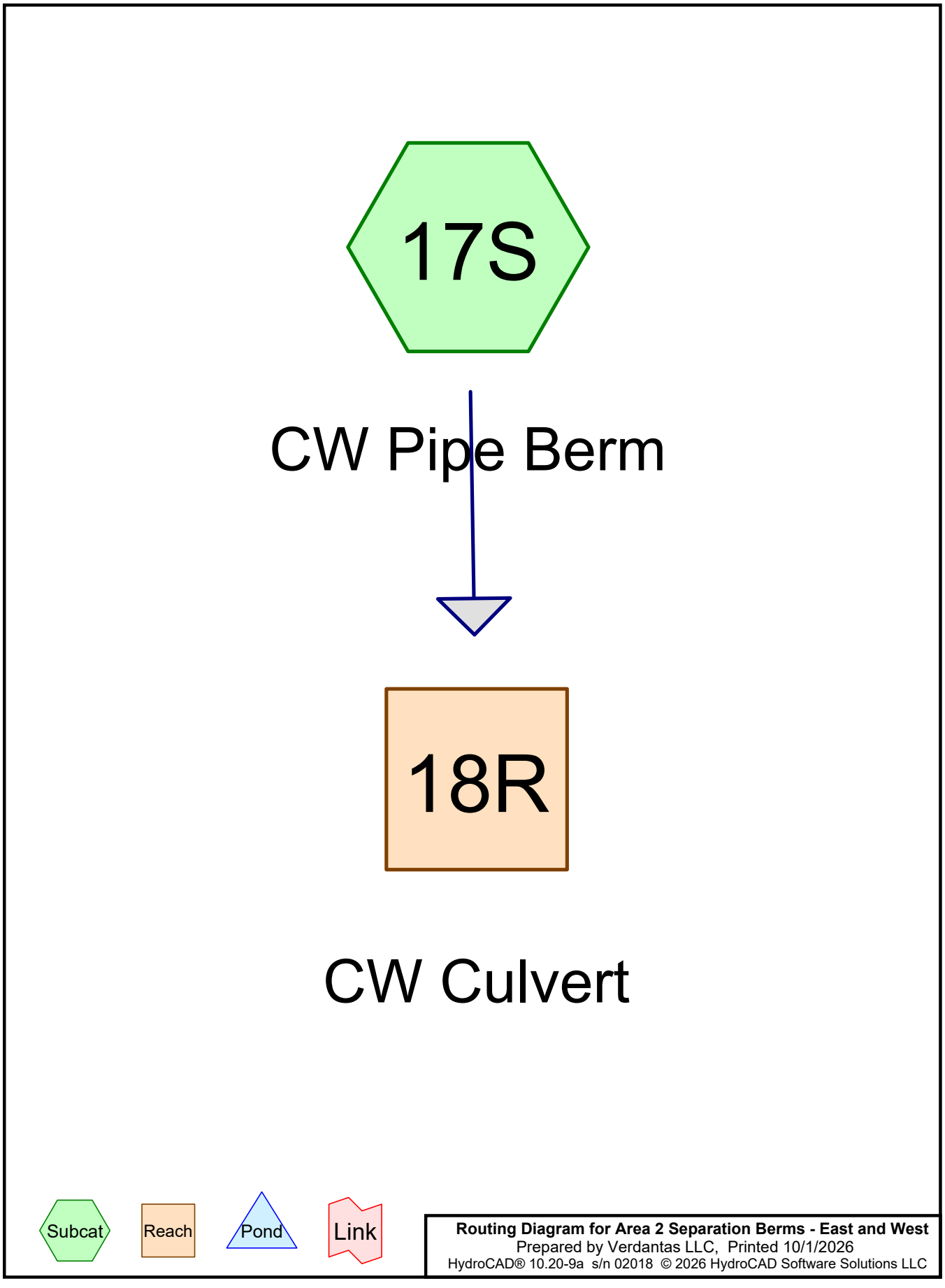
SCALE AS NOTED

SHEET 2

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Appendix B: Calculations

Appendix B-I:
Active Area Perimeter Berm Calculations



Routing Diagram for Area 2 Separation Berms - East and West
Prepared by Verdantas LLC, Printed 10/1/2026
HydroCAD® 10.20-9a s/n 02018 © 2026 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-YR	Type II 24-hr		Default	24.00	1	6.60	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
10.400	75	(17S)
10.400	**75**	**TOTAL AREA**

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	18R	1,188.37	1,181.40	171.0	0.0408	0.012	0.0	26.3	0.0	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment17S: CW Pipe Berm Runoff Area=10.400 ac 0.00% Impervious Runoff Depth=3.80"
Tc=12.2 min CN=75 Runoff=56.09 cfs 3.293 af

Reach 18R: CW Culvert Avg. Flow Depth=1.61' Max Vel=18.91 fps Inflow=56.09 cfs 3.293 af
26.3" Round Pipe n=0.012 L=171.0' S=0.0408 '/' Capacity=63.15 cfs Outflow=56.08 cfs 3.293 af

Total Runoff Area = 10.400 ac Runoff Volume = 3.293 af Average Runoff Depth = 3.80"
100.00% Pervious = 10.400 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 17S: CW Pipe Berm

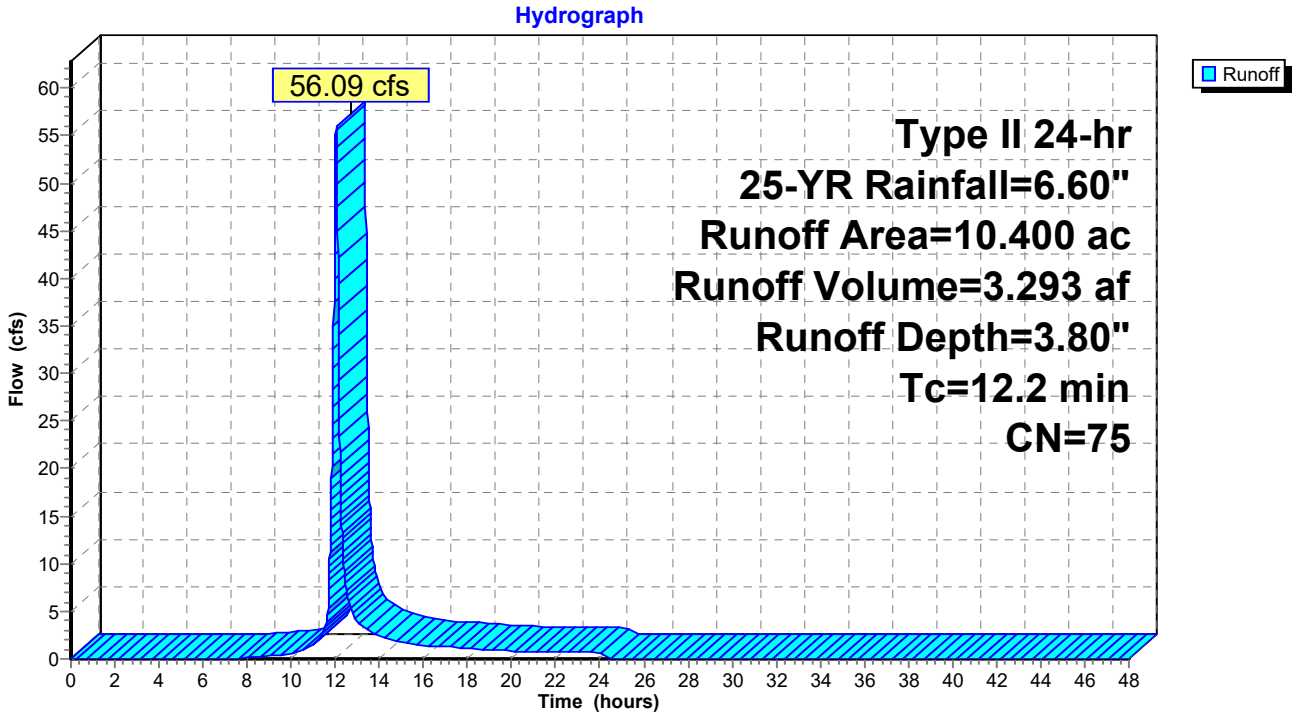
Runoff = 56.09 cfs @ 12.04 hrs, Volume= 3.293 af, Depth= 3.80"
Routed to Reach 18R : CW Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-YR Rainfall=6.60"

	Area (ac)	CN	Description
*	10.400	75	
	10.400		100.00% Pervious Area

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

Subcatchment 17S: CW Pipe Berm



Summary for Reach 18R: CW Culvert

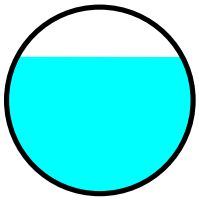
[52] Hint: Inlet/Outlet conditions not evaluated

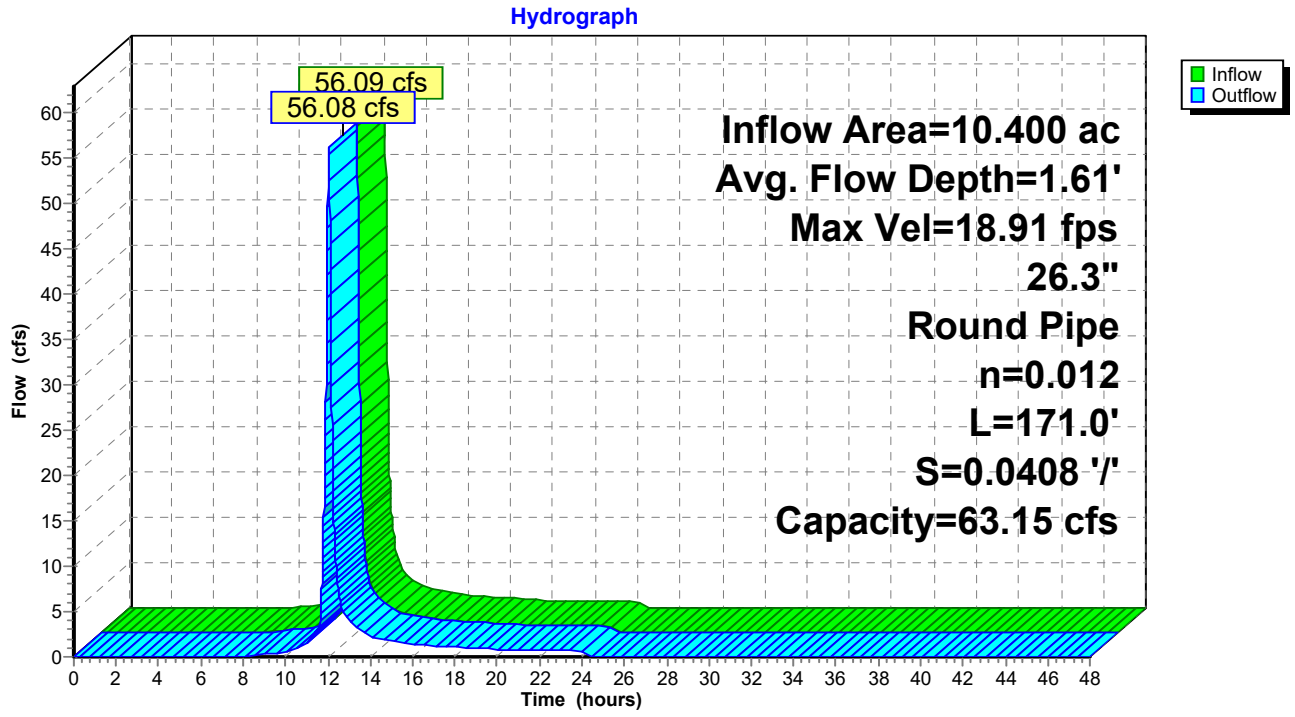
Inflow Area = 10.400 ac, 0.00% Impervious, Inflow Depth = 3.80" for 25-YR event
Inflow = 56.09 cfs @ 12.04 hrs, Volume= 3.293 af
Outflow = 56.08 cfs @ 12.04 hrs, Volume= 3.293 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 18.91 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 6.41 fps, Avg. Travel Time= 0.4 min

Peak Storage= 507 cf @ 12.04 hrs
Average Depth at Peak Storage= 1.61' , Surface Width= 1.94'
Bank-Full Depth= 2.19' Flow Area= 3.8 sf, Capacity= 63.15 cfs

26.3" Round Pipe
n= 0.012
Length= 171.0' Slope= 0.0408 '/'
Inlet Invert= 1,188.37', Outlet Invert= 1,181.40'





Appendix B-II:
Interim Contact Water Pipe Calculations

FLINT CREEK POWER PLANT LANDFILL
CONTACT WATER PIPE SIZING

OBJECTIVE

The purpose of this calculation is to determine an appropriate size and pipe specification for a contact water culvert designed to be installed as part of the Flint Creek Power Plant Landfill (Landfill) development of Areas 2, 3 and 4. This calculation is based on previous calculations and concepts from the March 2014 Final Approved Permit Application (Permit). The proposed Contact Water culvert pipe will convey contact water from the Landfill into the northern contact water concrete channel, which conveys contact water into the contact water pond, and from the contact water pond to the bottom ash pond.

ASSUMPTIONS

Within the Permit, calculations were submitted that detailed the design parameters for the construction of the Landfill. The following conclusions from the Permit will be used in this calculation:

- The largest allowable open area of the Landfill is 10.44 acres (Phase 3 from Permit)
- The 25-year, 24-hour storm is the design storm
- The peak flow from 10.44 acres during the design storm is 55.73 cubic feet per second (cfs)
    - Based on Appendix H-I, Attachment D of the Permit
- The concrete contact water channels are trapezoidal with a 6-foot bottom width, 2H:1V side slopes, and 2-foot height. Approximate slope of the channels is 1.7%
- The concrete channels can handle a 56 cfs discharge at a normal depth of 0.72', allowing for over 1 foot of freeboard.

Other information used:

- As-builts show an invert elevation of 1181.4 for the northern concrete contact water channel
- Approximate ground (top of geomembrane) elevation near culvert inlet is 1185.0 +/-
    - However, assume the pipe inlet sits on 1.5 feet of protective cover.
- Based on the manual for the Design of PE Piping Systems, a minimum bury depth for DR 17 pipe is 3 feet without doing any calculations. An absolute minimum cover of 1.5 feet is required.
- Based on Chapter 6, Section 3 of the PE Pipe design document, try a DR-17 pipe with 1.5 feet of cover, with an H-20 vehicle loading (16,000 lbs).

CALCULATIONS

Pipe Material Selection and Design

Based on the location, slopes, joint requirements, and contact water, an HDPE pipe is the most appropriate pipe to use for this application. The DR of the pipe must be selected based on the heavy traffic loads that will traverse the culvert over time. Additionally, with the size of the pipe and the requirement to turn the pipe so it discharges into the existing concrete channel, HDPE will allow for a pre-fabricated 115-degree elbow at a minimum 3.5-foot radius (along centerline) with a large pipe (this will allow for easy cleanout rather than a short radius bend).

Chapter 6 of the PE Pipe Design Document was utilized to calculate the minimum DR size of pipe needed for a shallow culvert with live load from heavy trucks (H-20). Refer to a separate pdf titled "Buried PE Pipe Design_JAH Calc" for those calculations. A 30" IPS DR 17 pipe, with 18" minimum cover was tried. Calculations for vehicular loading with shallow cover, deflection, and pipe wall compressive stress were performed. Based on those calculations, a 30" DR pipe can be installed at that minimum depth. However,

based on the potential for rutting since it's a gravel haul road, a 24" minimum depth will be suggested on the construction plans.

Contact Water Culvert Pipe Sizing

The required flow rate (Q_{req}) of the proposed contact water culvert pipe will be based on the peak flow from the largest open Area of the Landfill, per the Permit calculations (i.e., 56 cfs).

Since a 30" IPS DR 17 pipe worked for the minimum bury requirement, Flowmaster was used to determine the minimum slope needed to obtain a maximum flow capacity (Q_C) of a 30-inch HDPE IPS Pipe (inside diameter of 26.26 inches, or 2.19 feet) flowing full. The minimum required slope was calculated to be a 3.2% grade (see pages 4 and 5 of these calculations). The actual slope will meet these requirements.

CONCLUSION

The above calculations show that the proposed 30" HDPE IPS pipe at a slope of at least 3.2% will be sufficient for the contact water culvert pipe for the estimated peak flows determined by the previous Permit calculations and concepts, as well as should hold up under the haul road if it has a minimum cover of 24" under the haul road.

PIPE MATERIAL SPEC SHEET

PE 3608/3408 IPS HDPE PIPE SIZES

Pressure Rating		DR 17 (100psi)			DR 19 (89psi)			DR 21 (80psi)			DR 26 (65psi)			DR 32.5 (50psi)		
Nominal Size	Actual O.D.	Min. wall	Average I.D.	Weight lb/lf	Min. wall	Average I.D.	Weight lb/lf	Min. wall	Average I.D.	Weight lb/lf	Min. wall	Average I.D.	Weight lb/lf	Min. wall	Average I.D.	Weight lb/lf
3/4"	1.050"	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1"	1.315"	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1 1/4"	1.660"	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1 1/2"	1.900"	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2"	2.375"	0.140"	2.079"	0.429	---	---	---	---	---	---	---	---	---	---	---	---
3"	3.500"	0.206"	3.064"	0.932	---	---	---	---	---	---	---	---	---	---	---	---
4"	4.500"	0.265"	3.939"	1.540	0.237"	3.998"	1.387	0.214"	4.046"	1.262	0.173"	4.133"	1.030	0.138"	4.206"	0.831
5"	5.375"	0.316"	4.705"	2.197	0.283"	4.775"	1.980	0.256"	4.832"	1.801	0.207"	4.937"	1.470	0.165"	5.024"	1.186
5"	5.563"	0.327"	4.869"	2.353	0.293"	4.942"	2.120	0.265"	5.001"	1.929	0.214"	5.109"	1.574	0.171"	5.200"	1.270
6"	6.625"	0.390"	5.799"	3.338	0.349"	5.886"	3.007	0.315"	5.956"	2.736	0.255"	6.085"	2.233	0.204"	6.193"	1.801
7"	7.125"	0.419"	6.236"	3.860	0.375"	6.330"	3.478	0.339"	6.406"	3.165	0.274"	6.544"	2.582	0.219"	6.660"	2.083
8"	8.625"	0.507"	7.549"	5.657	0.454"	7.663"	5.097	0.411"	7.754"	4.637	0.332"	7.922"	3.784	0.265"	8.062"	3.053
10"	10.750"	0.632"	9.409"	8.788	0.566"	9.551"	7.918	0.512"	9.665"	7.204	0.413"	9.873"	5.878	0.331"	10.049"	4.742
12"	12.750"	0.750"	11.160"	12.362	0.671"	11.327"	11.138	0.607"	11.463"	10.134	0.490"	11.710"	8.269	0.392"	11.918"	6.671
14"	14.000"	0.824"	12.254"	14.905	0.737"	12.438"	13.429	0.667"	12.587"	12.218	0.538"	12.858"	9.970	0.431"	13.087"	8.044
16"	16.00"	0.941"	14.005"	19.467	0.842"	14.215"	17.540	0.762"	14.385"	15.959	0.615"	14.695"	13.022	0.492"	14.956"	10.506
18"	18.00"	1.059"	15.755"	24.638	0.947"	15.992"	22.199	0.857"	16.183"	20.198	0.692"	16.532"	16.480	0.554"	16.826"	13.296
20"	20.00"	1.176"	17.506"	30.418	1.053"	17.768"	27.406	0.952"	17.981"	24.936	0.769"	18.369"	20.346	0.615"	18.695"	16.415
22"	22.00"	1.294"	19.256"	36.805	1.158"	19.545"	33.162	1.048"	19.779"	30.172	0.846"	20.206"	24.619	0.677"	20.565"	19.863
24"	24.00"	1.412"	21.007"	43.801	1.263"	21.322"	39.465	1.143"	21.577"	35.907	0.923"	22.043"	29.299	0.738"	22.434"	23.638
26"	26.00"	1.529"	22.758"	51.406	1.368"	23.099"	46.316	1.238"	23.375"	42.141	1.000"	23.880"	34.385	0.800"	24.304"	27.742
28"	28.00"	1.647"	[illegible]	59.618	1.474"	24.876"	53.716	1.333"	25.173"	48.874	1.077"	25.717"	39.879	0.862"	26.174"	32.174
30"	30.00"	1.76[illegible]	26.259"	[illegible]8.439	1.579"	26.653"	61.664	1.429"	26.971"	56.105	1.154"	27.554"	45.779	0.923"	28.043"	36.934
32"	32.00"	1.882"	[illegible]	77.869	1.684"	28.429"	70.160	1.524"	28.770"	63.835	1.231"	29.391"	52.086	0.985"	29.913"	42.023
34"	34.00"	2.000"	29.760"	87.907	1.789"	30.206"	79.204	1.619"	30.568"	72.064	1.308"	31.228"	58.814	1.046"	31.782"	47.440
36"	36.00"	2.118"	31.511"	98.553	1.895"	31.983"	88.796	1.714"	32.366"	80.791	1.385"	33.065"	65.922	1.108"	33.652"	53.186
42"	42.00"	2.471"	36.762"	134.141	2.211"	37.314"	120.861	2.000"	37.760"	109.966	1.615"	38.575"	89.727	1.292"	39.260"	72.392
48"	48.00"	2.824"	42.014"	175.205	2.526"	42.644"	157.857	2.286"	43.154"	143.629	1.846"	44.086"	117.194	1.477"	44.869"	94.552
54"	54.00"	3.176"	47.266"	222.547	2.842"	47.975"	199.791	2.571"	48.549"	182.298	2.077"	49.597"	148.324	1.662"	50.478"	119.668
63"	62.99"	---	---	---	---	---	---	3.000"	56.631"	247.800	2.423"	57.854"	202.010	1.938"	58.881"	162.980

NOTE:

- Items highlighted in Blue indicates standard stocking items that are more readily available.
- Pressures are based on using water at 23°C (73°F).
- Average inside diameter calculated using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary.
- Service factors should be utilized to compensate for the effect of liquids other than water, and for other temperatures.
- Other piping sizes or DR's may be available upon request.
- Standard Lengths: 40' for 2"-24" / 50' for 26" and larger / Coils available for 3/4"-6"(8" by special order)

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Worksheet for Flint Creek - 3.2% - 30" DR 17 Contact Water Culvert

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.03200	ft/ft
Normal Depth	2.19	ft
Diameter	2.19	ft
Discharge	55.84	ft³/s

Results

Discharge	55.84	ft³/s
Normal Depth	2.19	ft
Flow Area	3.77	ft²
Wetted Perimeter	6.88	ft
Hydraulic Radius	0.55	ft
Top Width	0.00	ft
Critical Depth	2.16	ft
Percent Full	100.0	%
Critical Slope	0.02895	ft/ft
Velocity	14.82	ft/s
Velocity Head	3.42	ft
Specific Energy	5.61	ft
Froude Number	0.00	
Maximum Discharge	60.07	ft³/s
Discharge Full	55.84	ft³/s
Slope Full	0.03200	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%

Worksheet for Flint Creek - 3.2% - 30" DR 17 Contact Water Culvert

GVF Output Data

Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.19	ft
Critical Depth	2.16	ft
Channel Slope	0.03200	ft/ft
Critical Slope	0.02895	ft/ft

Appendix C:
Plan Review Log

Run-On and Run-Off Plan Amendment Log

By	Date	Amendment Description	PE Certification Required?	PE Name	Licensing State: Registration No.
Hull & Associates, Inc.	9/8/2016	Initial Plan	Yes	Angela M. Gerdeman	AR 14070
Hull & Associates, LLC.	9/17/21	5-Year Plan Revision	Yes	Angela M. Gerdeman	AR 14070
Verdantas, LLC	10/2/2026	5-Year Plan Revision	Yes	Trenton S. Hathaway	AR 25937