



Run-on and Run-off Control System Plan

5-YEAR UPDATE CERTIFICATION

Little Broad Run Landfill
Mountaineer 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: 45141

September 9, 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 Little Broad Run Landfill (Landfill) in New Haven, West Virginia, to comply with the requirements of Federal Regulation Title 40, Subpart §257.81. The Landfill is currently being operated under a Class F Industrial Landfill Facility permit (permit no. WV0077038), issued by the West Virginia Department of Environmental Protection (WVDEP).

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 is completed no later than October 17, 2016.
 2. Periodic run-on and run-off control system plans (from the date 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 September 2021), as required by § 257.81(c)(4), and is in general compliance and conformance with the requirements listed above. The design of the run-on and run-off control measures for the active portion of the CCR unit were completed as part of the current permit for the Landfill, which was obtained after submittal of the Little Broad Run Landfill Vertical Expansion Solid Waste/NPDES Permit Application, dated November 2008 (Vertical Expansion

Application). Run-on and run-off control measures for any areas outside the active area of the Landfill will be addressed during future closure activities, as needed, and controlled in accordance with Federal Regulation Title 40, Subpart §257.81.

The Landfill manages, installs, and maintains many of the necessary stormwater controls discussed within this Plan. Figures 1 through 6 in Appendix A provide additional information related to the controls.

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 a “valley fill” landfill and was constructed in such way that most stormwater flows away from the Landfill, thus not generating run-on. For the areas where stormwater flows towards the Landfill (northeast and southeast corners), perimeter ditches are located to collect run-on and keep it away from the Landfill. Run-on that is collected by these ditches is conveyed to the Area 7 Sediment Ponds, which ultimately discharge to Little Broad Run creek located east of the Landfill. Calculations verifying that the perimeter ditches can sufficiently manage the peak flow from a 24-hour, 25-year storm event are provided in Appendices H-II through I-IV of the *Engineering Design Report* prepared by Hull & Associates, Inc. (Hull), dated November 2008, included with the Vertical Expansion Application.

Figure 1 shows the general layout of the Landfill and existing topography.

2.2 Run-on Controls from Inside the Landfill Footprint

The Landfill, since obtaining approval from WVDEP for the Vertical Expansion Application, is being developed in phases in accordance with the phasing plan from the Vertical Expansion Application. Each phase is developed in sub-phases (cells) based on the Landfill’s needs and long-term plans. During construction of each new cell, perimeter berms are constructed along the boundaries of the cell in areas where run-on may occur. Low-lying areas are also filled to promote stormwater drainage away from the new cell.

2.2.1 Current Phase (Phase 1)

The current phase of the Landfill is Phase 1, which consists of filling the middle of the northern portion of the Landfill, as shown on Figure 2. During operations of the Landfill, filling occurs in such a way that the upstream or upper-most area of the phase is filled first. Filling then progresses upwards and towards the downstream portions of the phase. This filling practice, along with the cell perimeter berms, minimize run-on towards the active portion of the Landfill.

2.2.2 Future Phases

Future phases of the Landfill (Phases 2 through 5) will occur in sequence, in accordance with the Vertical Expansion Application. The final grades for the preceding phase will be dependent upon the Landfill operational needs. Areas that reach final approved grades during the previous phase may be covered with the Final Cover System. Stormwater from these areas will be managed in accordance with the Vertical Expansion Application and Section 3.1 of this Plan, and therefore, will not generate run-on towards the active portion of the Landfill. For the areas from the preceding phase(s) that are at higher elevations than the phase at any given time, diversion berms will be constructed to divert stormwater around the active portion of the Landfill to minimize stormwater run-on, as shown on Figures 3 through 6. The diversion berms will be constructed of soil, per Detail 3 on Drawing no. 1-30134-28 from the Vertical Expansion Application. These diversions will discharge to stormwater management structures (e.g., letdowns, ditches, culverts, etc.) located either within the Landfill boundary (outside of the active portion of the Landfill) or outside the Landfill boundary, which ultimately discharge to sediment ponds. Water discharged from the sediment ponds flows to outfalls per the Landfill's NPDES permit. The size of the areas downstream of the diversion berms will be as small as practical based on site conditions and stormwater from these areas will be managed as contact water in accordance with Section 3.2 of this Plan. Calculations were performed to verify that the diversion berms will manage the peak flow from a 24-hour, 25-year storm event and are provided in Appendix B.

3. Run-off Controls

The Preamble from Subpart 257 of CFR 40 defines run-off as “any liquid that drains over land from any part of the CCR landfill.” This section of this Plan describes the controls at the Landfill to manage run-off from the Landfill’s Final Cover System and from the active filling area, which are designed to manage the peak flow from a 24-hour, 25-year storm event. Details for the run-off controls discussed below are provided in the Vertical Expansion Application and are shown on Figures 2 through 6.

3.1 Run-off Controls From the Landfill’s Final Cover System

The Landfill’s Final Cover System has been designed to minimize stormwater infiltration into the Landfill, thus minimizing leachate generation. The surface of the Final Cover System consists of a vegetated cover to minimize erosion of the final cover soils. Stormwater from the Final Cover System flows away from the active filling area and discharges to perimeter ditches, which ultimately discharge to sediment ponds. Water discharged from the sediment ponds flow to outfalls per the Landfill’s NPDES permit.

There are areas from the Landfill’s original permit that have vegetated soil cover placed in accordance with the original permit (Areas 1 through 4 shown in Figure 1). These areas ultimately discharge off-site to outfalls per the Landfill’s NPDES permit.

As the new phases of the Landfill are developed and filled, Final Cover System will be placed in accordance with the Vertical Expansion Application. Run-off from the new phases will be collected and conveyed by the stormwater control structures (e.g., letdowns, ditches, culverts, etc.) and discharge to sediment ponds per the Vertical Expansion Application. The supporting design calculations for the run-off controls are provided in Appendix H of the *Engineering Design Report* included with the Vertical Expansion Application.

3.2 Run-off Controls from Active Fill Areas

Run-off generated within the active filling area will be managed as contact water and conveyed to the Leachate Ponds located east of the Landfill. As waste is placed in the active filling areas, the outer slopes will be covered in accordance with the permit to minimize contact water generation. “Chimney drains” made with bottom ash are located in several areas of the Landfill to convey contact water within the active areas to the leachate collection system in the bottom of the Landfill. Also, filling operations will occur in such a way that the inner grades of the Landfill will be sloped to allow contact water (i.e., contact water that is not drained by the “chimney drains”) to gravity-drain to a low spot within the active area and be pumped to the manhole southeast of Area 7 (Manhole 1), which then gravity drains to the Leachate Ponds. Perimeter berms are installed to keep the water within the active area prior to pumping. Details and the design calculations for the run-off controls are provided in Appendix H of the *Engineering Design Report* included with the Vertical Expansion Application.

3.3 Leachate Collection and Management System

Landfill leachate is managed in accordance with the Vertical Expansion Application. Leachate collected within the Landfill is conveyed via gravity to the Leachate Ponds. Leachate is then pumped to the Leachate Surge Pond, which is a retention pond that is designed to accommodate large storm events, as detailed in the Leachate Surge Pond Design Package, prepared by Hull, dated October 2010. An on-site treatment system has been constructed to treat the Landfill's leachate prior to discharging it to the Mountaineer Water Treatment Pond Complex, which ultimately discharges to the Ohio River.

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 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.

Digitally signed by
Chelsea Lee Feldman
Date: 2026.09.09
16:10:12-04'00'

Signature _____

Name Chelsea Lee Feldman

Registration Number 28149

State West Virginia

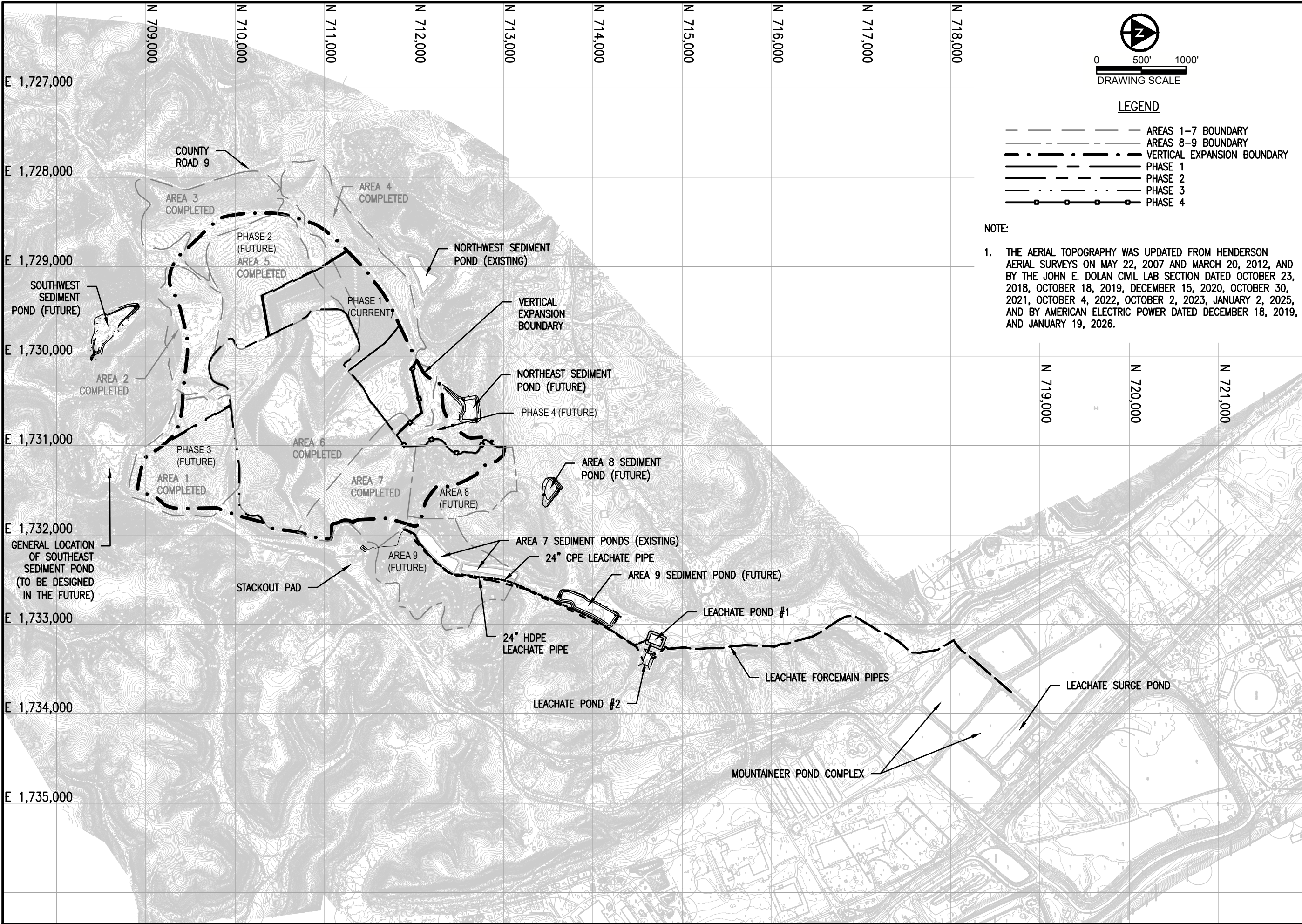
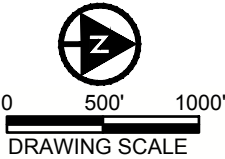
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Appendix A: Figures

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LEGEND

- AREAS 1-7 BOUNDARY
- AREAS 8-9 BOUNDARY
- .- VERTICAL EXPANSION BOUNDARY
- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4

NOTE:

1. THE AERIAL TOPOGRAPHY WAS UPDATED FROM HENDERSON AERIAL SURVEYS ON MAY 22, 2007 AND MARCH 20, 2012, AND BY THE JOHN E. DOLAN CIVIL LAB SECTION DATED OCTOBER 23, 2018, OCTOBER 18, 2019, DECEMBER 15, 2020, OCTOBER 30, 2021, OCTOBER 4, 2022, OCTOBER 2, 2023, JANUARY 2, 2025, AND BY AMERICAN ELECTRIC POWER DATED DECEMBER 18, 2019, AND JANUARY 19, 2026.

verdantas

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

DESIGNED BY	DRAWN BY	CHECKED BY	PROJECT NO.
SAS	JRS	CLF	45141

NEW HAVEN ~ MASON COUNTY ~ WEST VIRGINIA

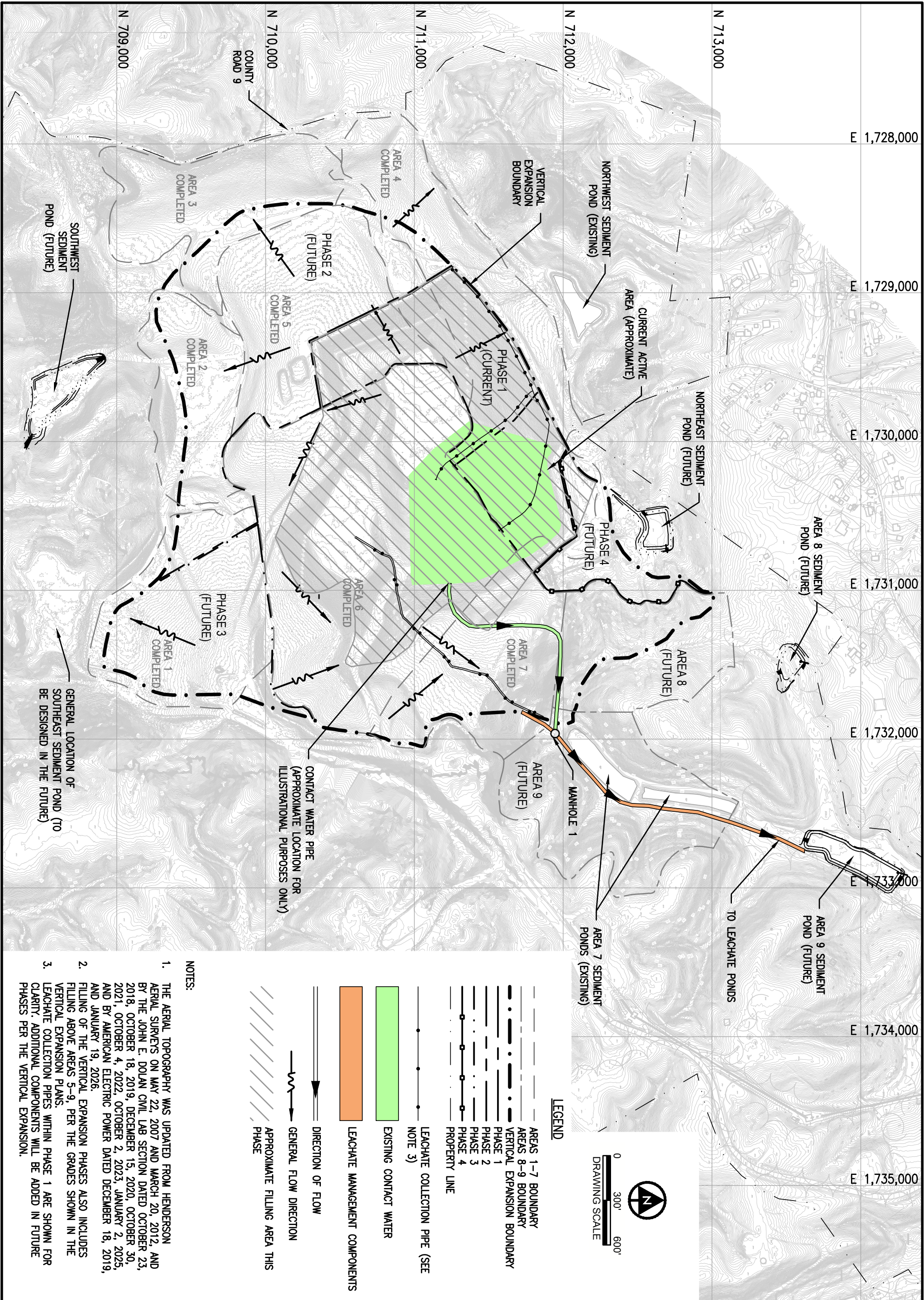
MOUNTAINEER PLANT

LITTLE BROAD RUN LANDFILL

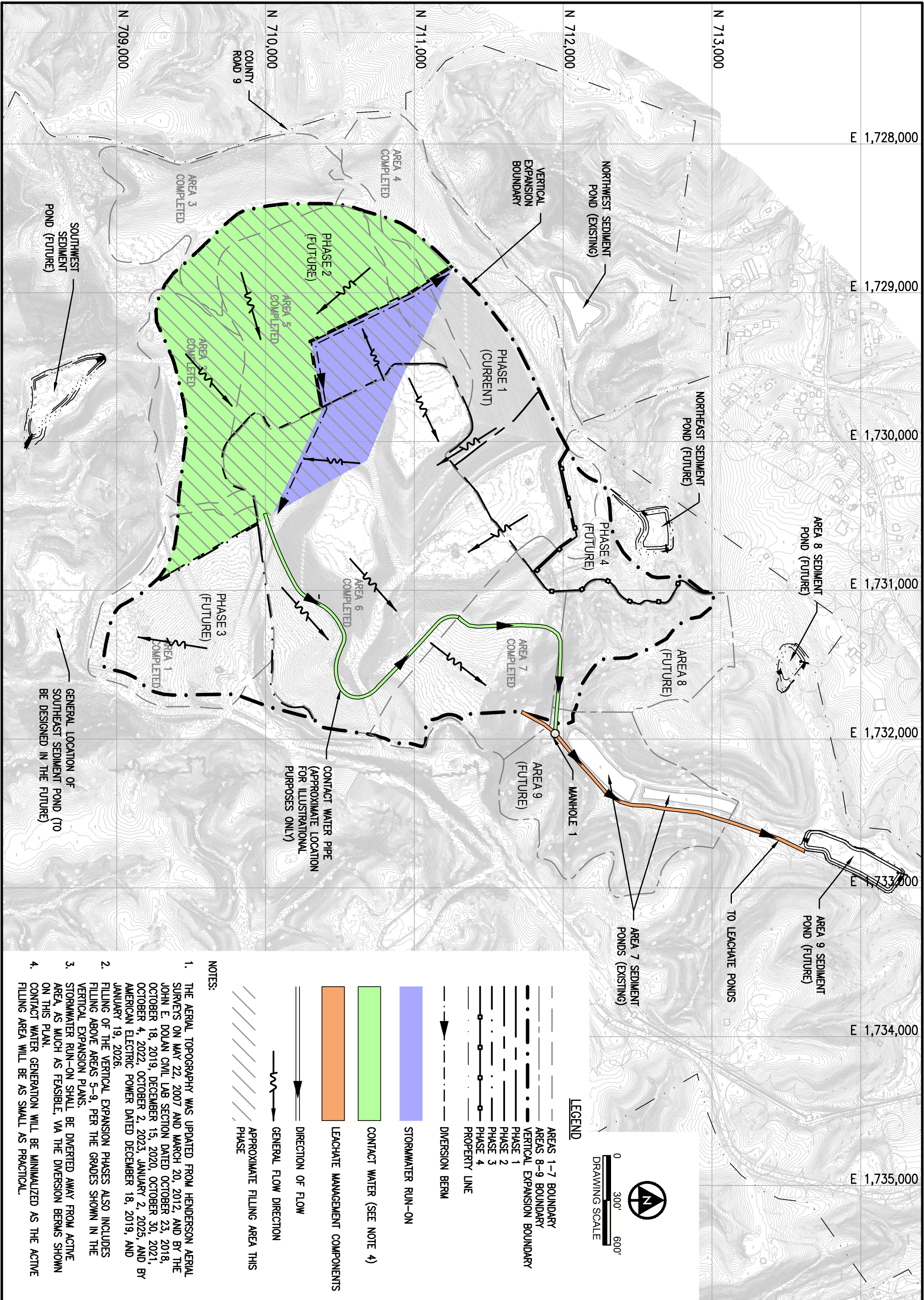
FIGURE 1

GENERAL SITE PLAN

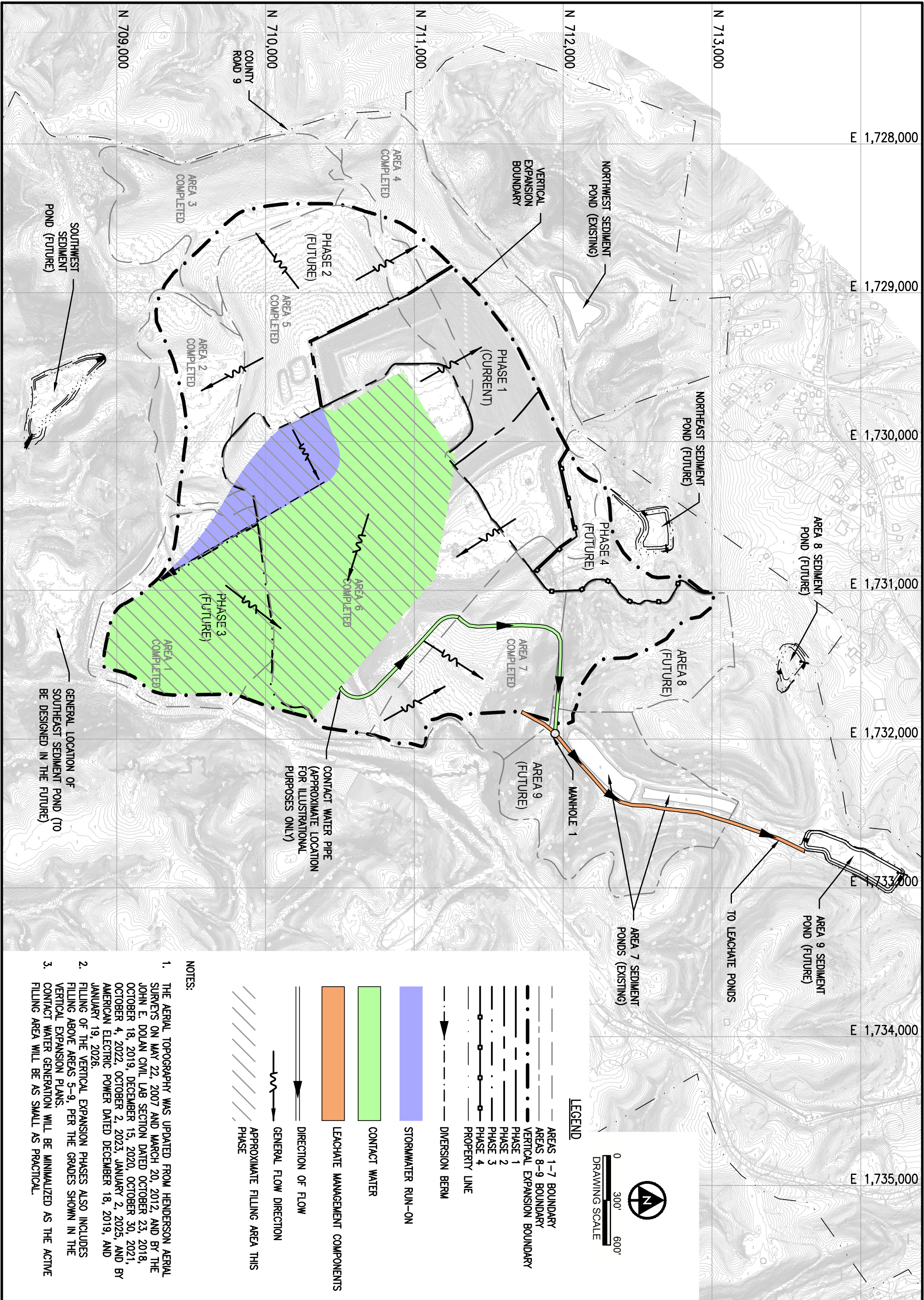
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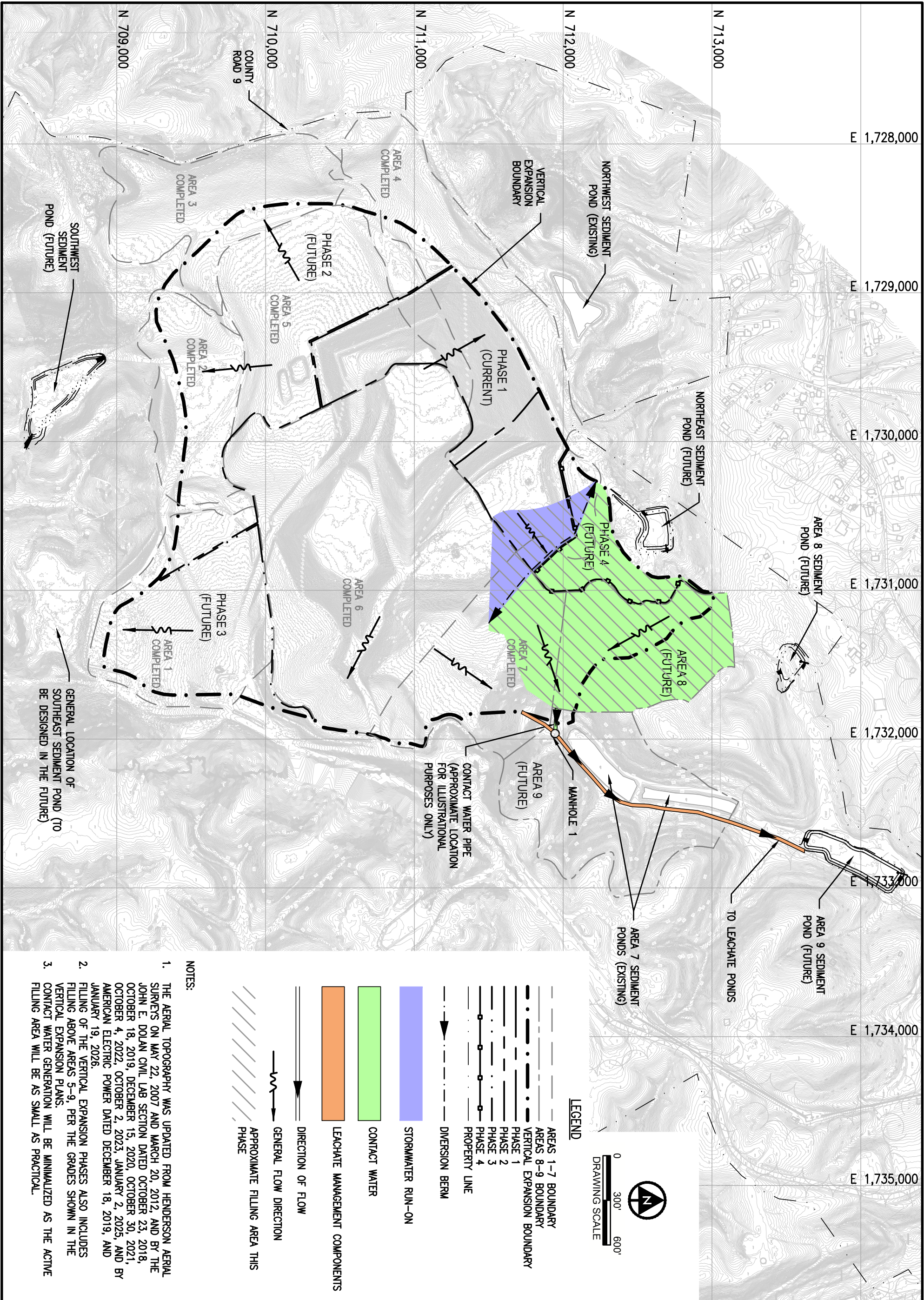
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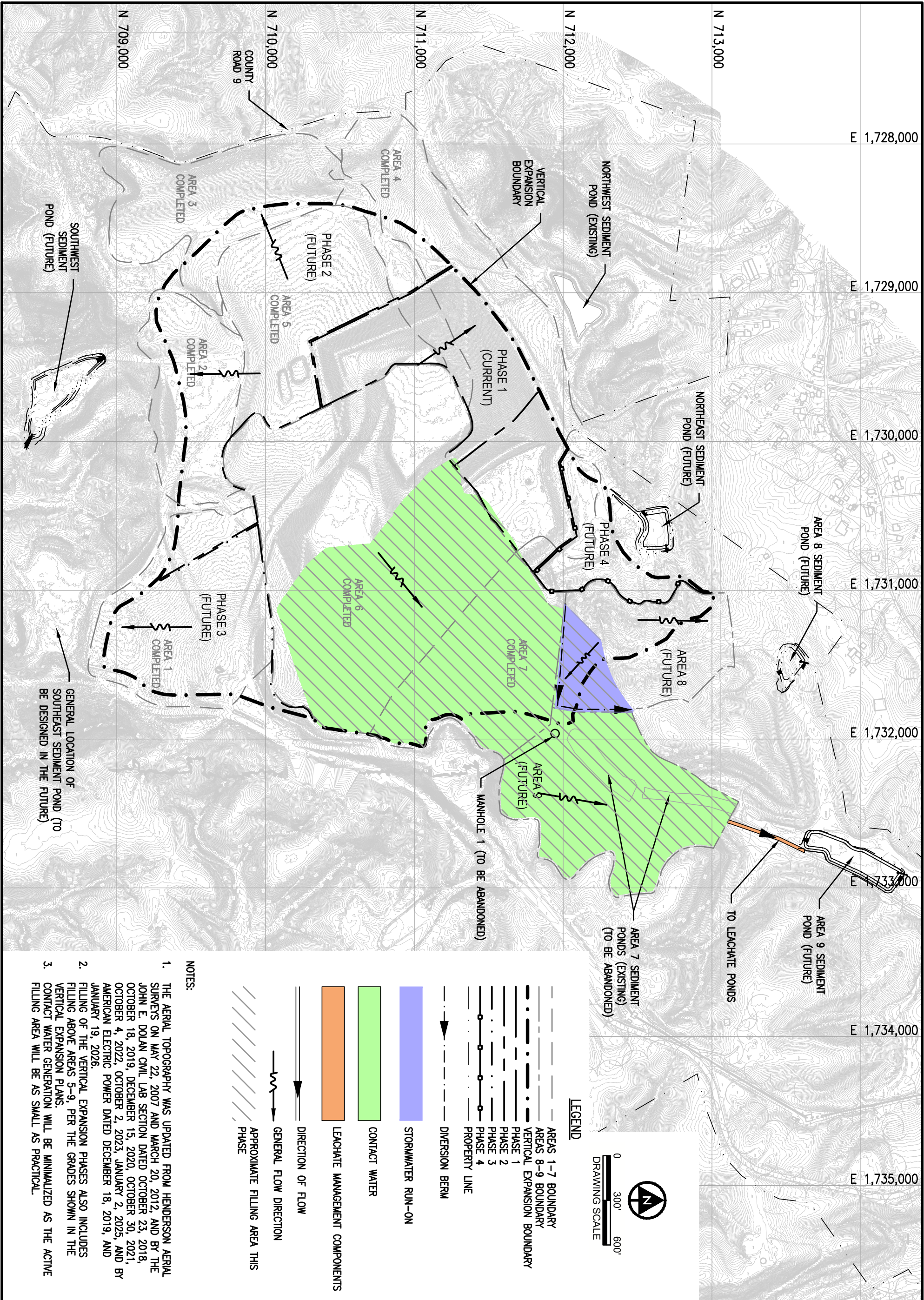
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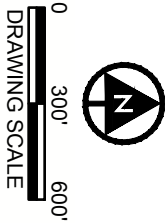
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SCALE	AS NOTED			
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- NOTES:
1. THE AERIAL TOPOGRAPHY WAS UPDATED FROM HENDERSON AERIAL SURVEYS ON MAY 22, 2007 AND MARCH 20, 2012, AND BY THE JOHN E. DOLAN CIVIL LAB SECTION DATED OCTOBER 23, 2018, OCTOBER 18, 2019, DECEMBER 15, 2020, OCTOBER 30, 2021, OCTOBER 4, 2022, OCTOBER 2, 2023, JANUARY 2, 2025, AND BY AMERICAN ELECTRIC POWER DATED DECEMBER 18, 2019, AND JANUARY 19, 2026.
 2. FILLING OF THE VERTICAL EXPANSION PHASES ALSO INCLUDES FILLING ABOVE AREAS 5-9, PER THE GRADES SHOWN IN THE VERTICAL EXPANSION PLANS.
 3. CONTACT WATER GENERATION WILL BE MINIMALIZED AS THE ACTIVE FILLING AREA WILL BE AS SMALL AS PRACTICAL.

LEGEND

- AREAS 1-7 BOUNDARY
- AREAS 8-9 BOUNDARY
- VERTICAL EXPANSION BOUNDARY
- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PROPERTY LINE
- DIVERSION BERM
- STORMWATER RUN-ON
- CONTACT WATER
- LEACHATE MANAGEMENT COMPONENTS
- DIRECTION OF FLOW
- GENERAL FLOW DIRECTION
- APPROXIMATE FILLING AREA THIS PHASE



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<div>NEW HAVEN ~ MASON COUNTY ~ WEST VIRGINIA</div> <div>MOUNTAINEER PLANT</div> <div>LITTLE BROAD RUN LANDFILL</div> <div>PHASE 5</div> <div>RUN-ON AND RUN-OFF CONTROLS</div>		
DATE	8/25/2026	
SCALE	AS NOTED	
SHEET	6	

Appendix B: Calculations

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	49.77	1	720	120,397	----	-----	-----	Area 1 to Area 2
Run-on.gpw					Return Period: 25 Year			Friday, Sep 9, 2016	

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, Sep 9, 2016

Hyd. No. 1

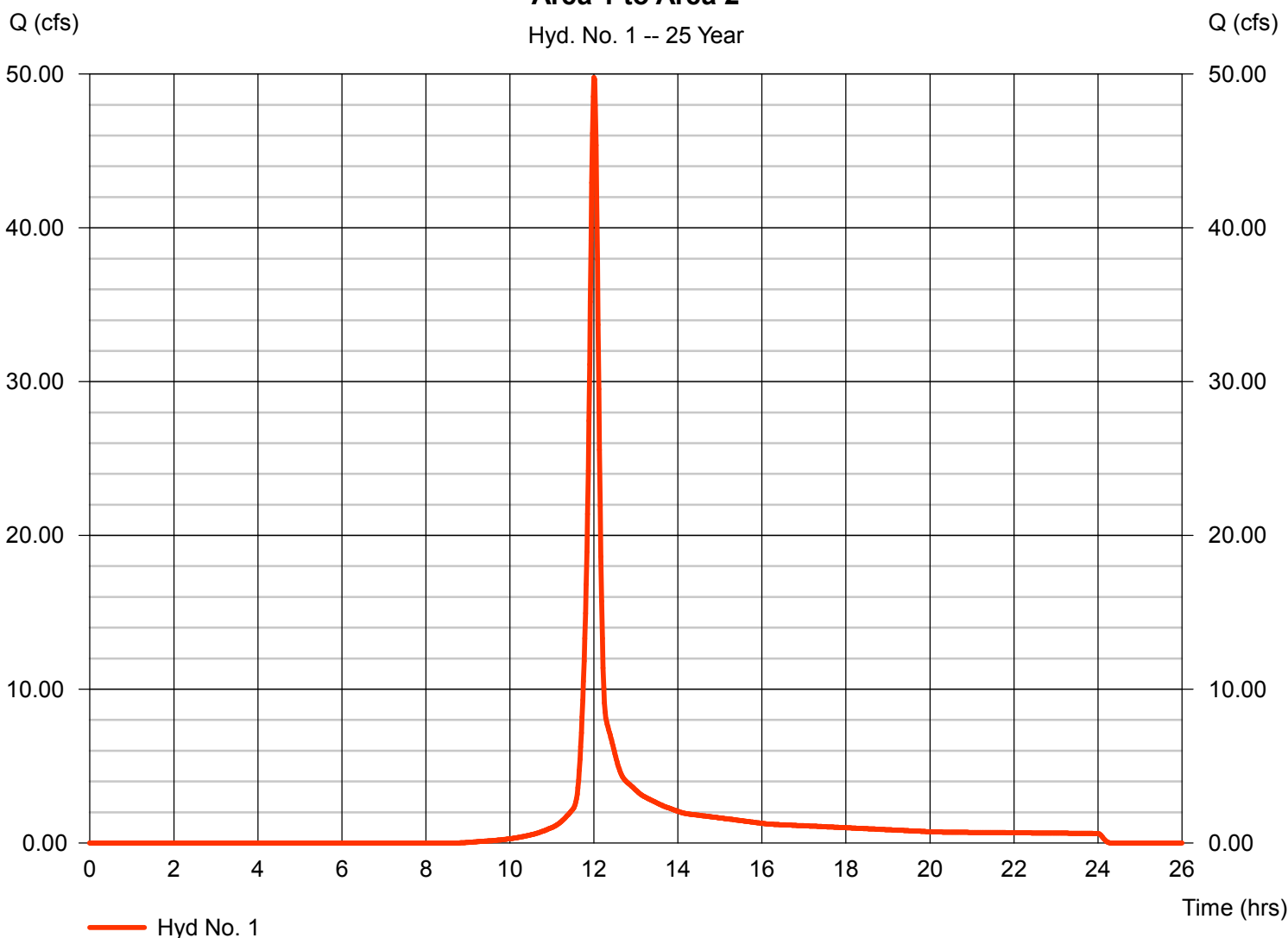
Area 1 to Area 2

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 1 min
 Drainage area = 16.300 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 4.14 in
 Storm duration = 24 hrs

Peak discharge = 49.77 cfs
 Time to peak = 12.00 hrs
 Hyd. volume = 120,397 cuft
 Curve number = 78
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 11.70 min
 Distribution = Type II
 Shape factor = 484

Area 1 to Area 2

Hyd. No. 1 -- 25 Year



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No. 1

Area 1 to Area 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.200	0.011	0.011				
Flow length (ft)	= 300.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 2.55	0.00	0.00				
Land slope (%)	= 33.00	0.00	0.00				
Travel Time (min)	= 10.84	+	0.00	+	0.00	=	10.84
Shallow Concentrated Flow							
Flow length (ft)	= 500.00	0.00	0.00				
Watercourse slope (%)	= 33.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 9.27	0.00	0.00				
Travel Time (min)	= 0.90	+	0.00	+	0.00	=	0.90
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					11.70 min		

Run-On Diversion Berm

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01000	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	33.00	ft/ft (H:V)
Discharge	49.77	ft ³ /s

Results

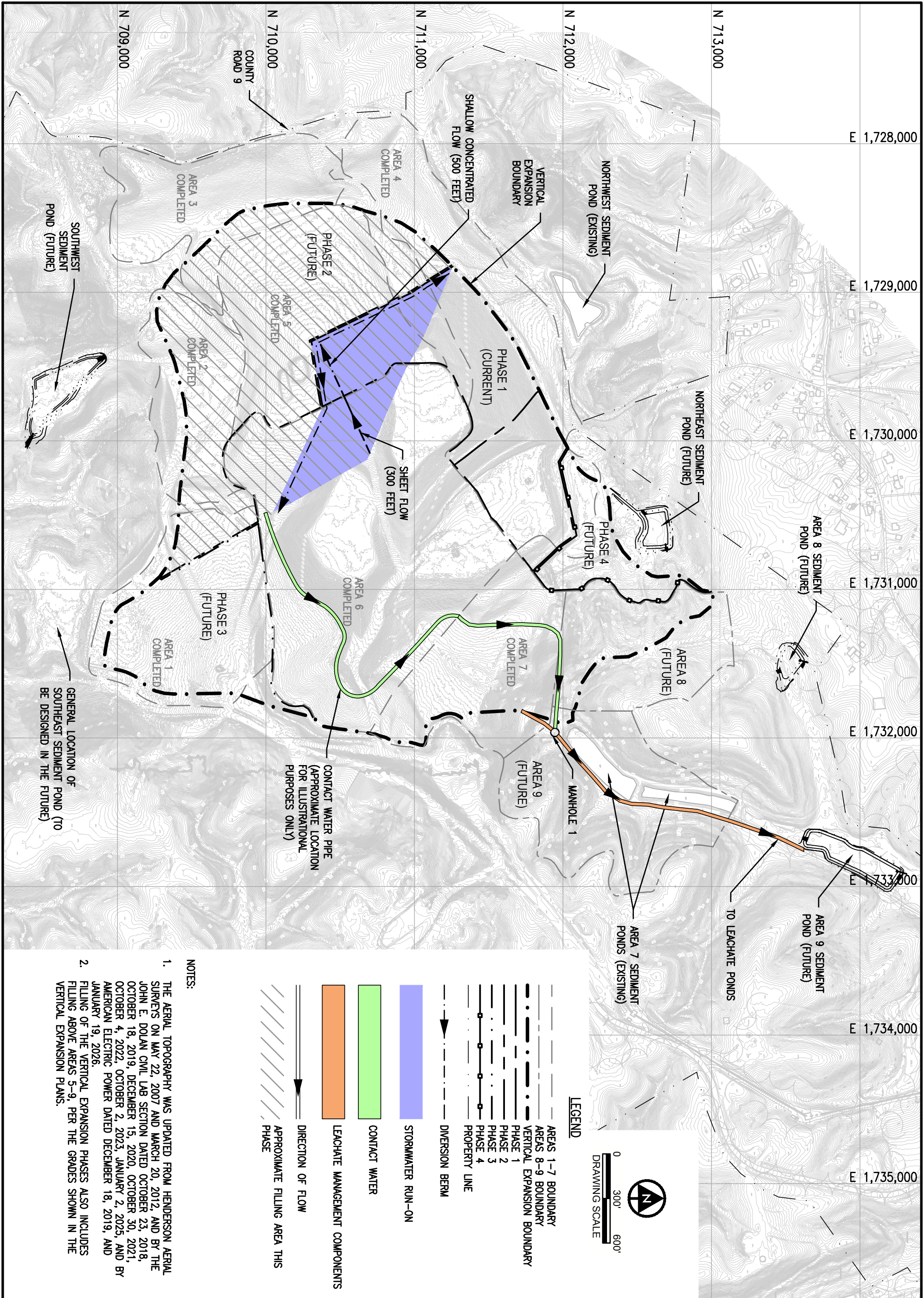
Normal Depth	0.97	ft
Flow Area	16.38	ft ²
Wetted Perimeter	34.11	ft
Hydraulic Radius	0.48	ft
Top Width	33.87	ft
Critical Depth	0.87	ft
Critical Slope	0.01747	ft/ft
Velocity	3.04	ft/s
Velocity Head	0.14	ft
Specific Energy	1.11	ft
Froude Number	0.77	
Flow Type	Subcritical	

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
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.97	ft
Critical Depth	0.87	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01747	ft/ft



SHEET --	SCALE AS NOTED	DATE 8/25/2026	<p align="center">NEW HAVEN ~ MASON COUNTY ~ WEST VIRGINIA</p> <p align="center">MOUNTAINEER PLANT</p> <p align="center">LITTLE BROAD RUN LANDFILL</p> <p align="center">DIVERSION BERM CALCULATIONS</p>	DESIGNED BY SAS	 <p>verdantas</p> <p>219 SOUTH ERIE STREET TOLEDO, OH 43604 TEL. 419-385-2018</p>
				DRAWN BY SAS	
				CHECKED BY CLF	
				PROJECT NO. 45141	

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.	9/29/2016	Initial Plan	Yes	Angela M. Gerdeman	WV 17858
Hull & Associates, LLC	9/29/2021	5-Year Plan Revision	Yes	Angela M. Gerdeman	WV 17858
Verdantas, LLC	09/09/2026	5-Year Plan Revision	Yes	Chelsea L. Feldman	WV 28149