

Barkley Road Passive Treatment System

Brady Township, Butler County, Pennsylvania

Operation & Maintenance Plan



November 2022

Prepared by:



BioMost, Inc.
Mining & Reclamation Services
434 Spring Street Ext., Mars, PA 16046
www.biomost.com

Prepared for:



Stream Restoration Incorporated
Butler County, PA
www.streamrestorationinc.org

Table of Contents

<u>Item</u>	<u>Pages</u>
Operation & Maintenance Plan	1
▪ O&M Schedule	1 Page
Appendix 1 – Discharge Table	Appendix 1
▪ 90° V-Notch Weir Discharge Table	1 Page
Appendix 2 – Inspection Form	Appendix 2
▪ Passive Treatment System O&M Inspection Form	1 Page
Appendix 3 – Schematic	Appendix 3
▪ Schematic with Water Monitoring Locations	1 Page
Appendix 4 – As Built Plans	Appendix 4
▪ Plan View	Sheet 1
▪ Details	Sheet 2

O&M Schedule

Monthly (Frequency may be reduced based on system performance)

- Measure and record flow at the 6" 90° V-notch weir (MSP-1)
 - V-notch weir should be cleaned of debris and precipitates both upstream and downstream as needed, then allow time for water level to reach equilibrium before taking flow
 - Staff gauge, found on upstream side of V-notch weir, should be cleaned, and replaced as needed
 - Staff gauge zero mark should be at same elevation as the crest of the 6" 90° V-notch weir, and staff gauge should be positioned vertical and plumb
 - Flow can be determined from weir discharge table using staff gauge reading (Appendix 1)
- Visual inspection of all components, ditches, etc.
- Check pH and alkalinity at MSP-3 outlet
 - pH should always be >6.0
- Inspection form to be completed during site visit (Appendix 2)
- Upload all monitoring data to www.datashed.org

Annually

- At a minimum, during typical high-flow (February – May) collect samples for laboratory analysis at:
 - MSP-1, MSP-2, and MSP-3 (See Appendix 3 and 4, for sample point locations)
 - Minimum parameters per sample point: pH, conductivity, acidity, alkalinity, iron, aluminum, manganese
 - At MSP-3 iron should be <3.0 mg/L
 - Measure flow at MSP-1 as described above.
 - Upload all monitoring data to www.datashed.org
- Exercise Sludge Pond valve (fully shut and open as appropriate and leave in open position)

As Needed

- Sediment removed from Collection Pond, Wetland, and Settling Pond should be placed in Sludge Pond
- Remove vegetation from spillways, channels, pipes, embankments, etc.
- General site maintenance of ditches, level spreaders, etc.
- Replace or repair V-Notch Weir

APPENDIX 1

90° V-Notch Weir Discharge Table

Staff Reading Head (Decimal ft)	Staff Reading Head (fractional in)	Flow (gpm)
0.01	1/8	0.01
0.02	1/4	0.06
0.03	3/8	0.17
0.04	1/2	0.36
0.05	5/8	0.63
0.06	3/4	0.99
0.07	7/8	1.45
0.08	1	2.03
0.09	1 1/8	2.73
0.10	1 1/4	3.55
0.11	1 3/8	4.50
0.12	1 1/2	5.60
0.13	1 1/2	6.84
0.14	1 5/8	8.23
0.15	1 3/4	9.78
0.16	1 7/8	11.49
0.17	2	13.37
0.18	2 1/8	15.42
0.19	2 1/4	17.66
0.20	2 3/8	20.07
0.21	2 1/2	22.67
0.22	2 5/8	25.47
0.23	2 3/4	28.47
0.24	2 7/8	31.66
0.25	3	35.06
0.26	3 1/8	38.67
0.27	3 1/4	42.50
0.28	3 3/8	46.55
0.29	3 1/2	50.81
0.30	3 5/8	55.31
0.31	3 3/4	60.03
0.32	3 7/8	64.99
0.33	4	70.19
0.34	4 1/8	75.63
0.35	4 1/4	81.31
0.36	4 3/8	87.25
0.37	4 1/2	93.43
0.38	4 4/8	99.87
0.39	4 5/8	106.57
0.40	4 3/4	113.54
0.41	4 7/8	120.77
0.42	5	128.27
0.43	5 1/8	136.04
0.44	5 1/4	144.09
0.45	5 3/8	152.41
0.46	5 1/2	161.02
0.47	5 5/8	169.92
0.48	5 3/4	179.10
0.49	5 7/8	188.57
0.50	6	198.34

APPENDIX 2

Inspection Form

PASSIVE TREATMENT SYSTEM O&M INSPECTION REPORT

11/2022

Inspection Date: _____	Project Name: Barkley Road Treatment System (Moraine State Park)
Inspected by: _____	Municipality: Brady Township
Organization: _____	County: Butler State: PA
Time Start: _____ End: _____	Project Coordinates: 40.970265 Lat -80.022998 Long
Receiving Stream: Lake Arthur	Subwatershed: Muddy Creek Watershed: Slippery Rock Creek

Weather (circle one): Snow Heavy Rain Rain Light Rain Overcast Fair/Sunny **Temp(°F):** #32 33-40 41-50 51-60 60+
 Is maintenance required? Yes/No If yes, provide explanation:

INSPECTION SUMMARY

A. Site Vegetation (Uplands and Associated Slopes)

Overall condition of vegetation on site: 0 1 2 3 4 5 (0=poor, 5=excellent, circle one) (See instructions.)

Is any reseeding required? Yes/No If yes, describe area size and identify location on Site Schematic:

B. Vandalism and "Housekeeping"

Is there litter around or in the passive system? Yes/No? If Yes, was the litter picked up? Yes/No?
 Is there litter that may be considered hazardous or dangerous that requires special disposal? Yes/No?
 Is there evidence of vandalism to the passive system? Yes/No?

Additional comments: _____

C. Passive Treatment System Components

Component	Erosion Rills (Y/N)	Berms Stable (Y/N)	Vegetation Successful (Y/N)	Siltation Significant (Y/N)	Water Level Change (Y/N)	Valves Operable (Y/N)	Spillways Operable (Y/N)	Maintenance Performed and Remaining <small>Indicate which component i.e. SP</small>
Collection Pond						NA		
Wetland						NA		
Settling Pond						NA		
Sludge Pond							NA	

Additional Comments:

D. Wildlife Utilization

Animal sighted or tracks observed _____

Invasive plants observed _____

Describe any damage caused to treatment system by wildlife (especially muskrats) and required maintenance: _____

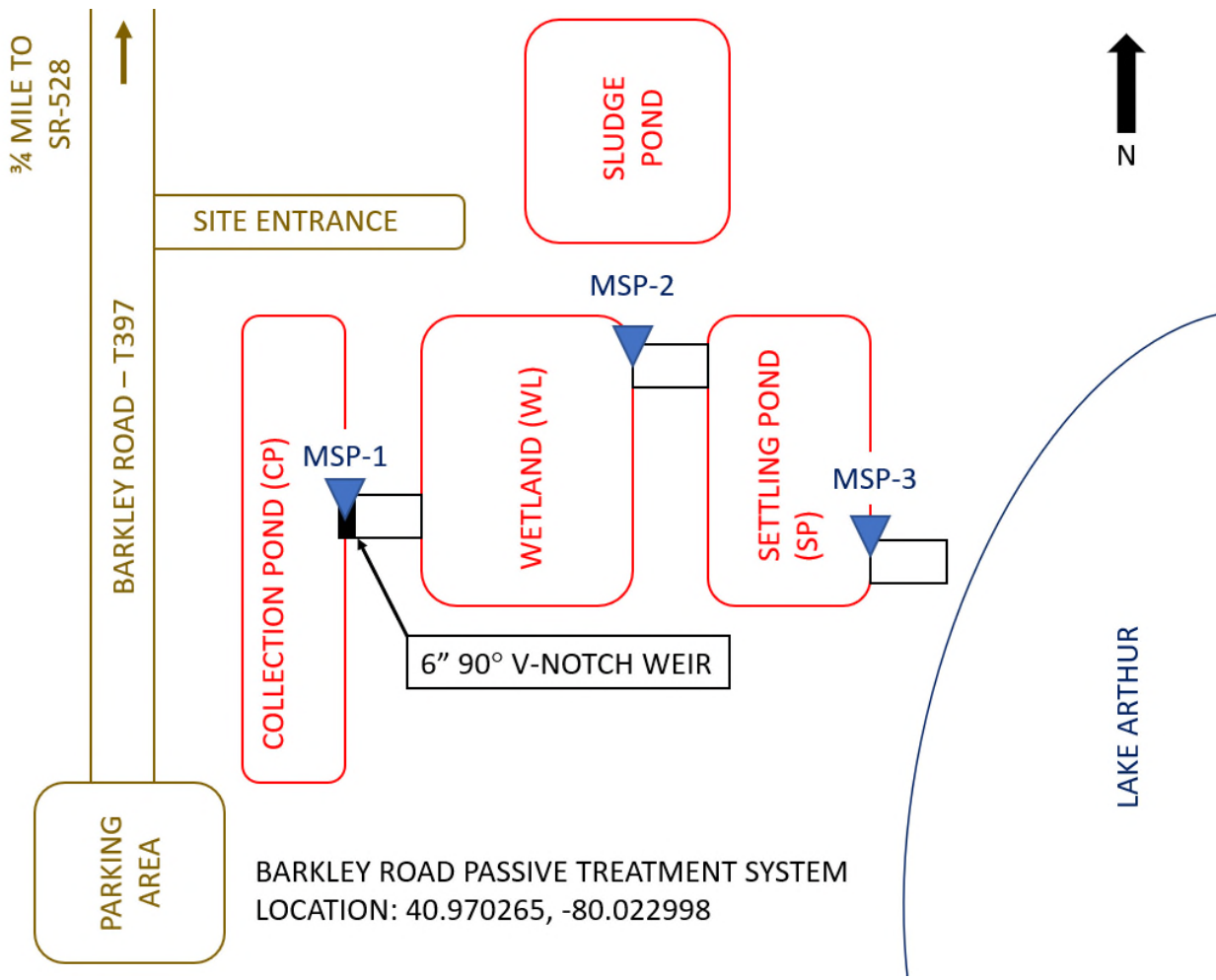
E. Field Water Monitoring and Sample Collection - Raw water sample locations as marked on As-Built plan and schematic. For passive components sample effluent.

- Not monitored

Sampling Point	Flow Measurement		Calculated Flow (gpm)	pH	Temp (°C)	Alkalinity (mg/L)	DO (mg/L)	Iron (mg/L)	Comments	Bottle #	Bottle # (total metals)	Bottle # (diss. metals)
	gals	sec.										
MSP-1												
MSP-2												
MSP-3												

APPENDIX 3

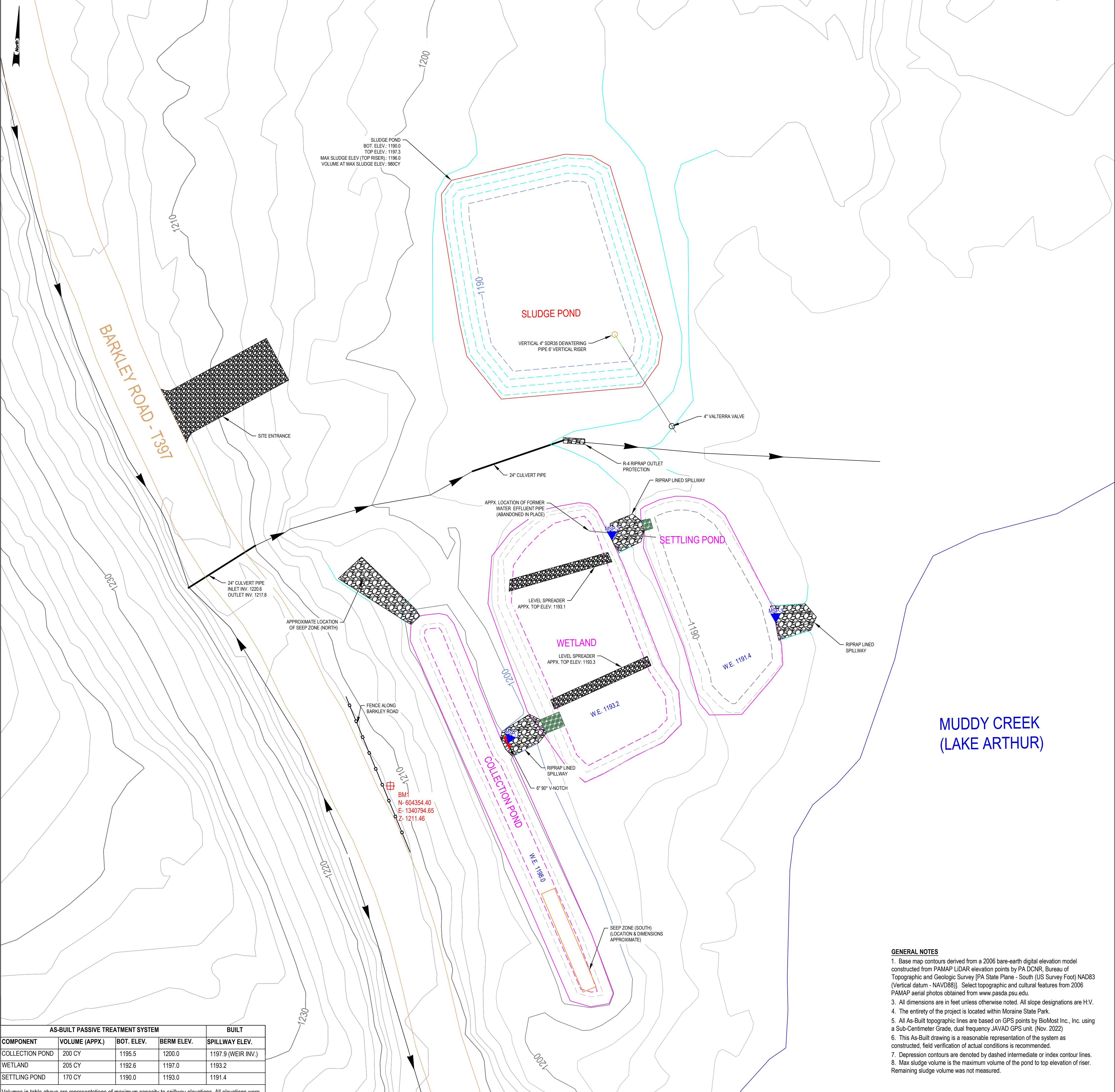
Schematic



BARKLEY ROAD PASSIVE TREATMENT SYSTEM
LOCATION: 40.970265, -80.022998

APPENDIX 4

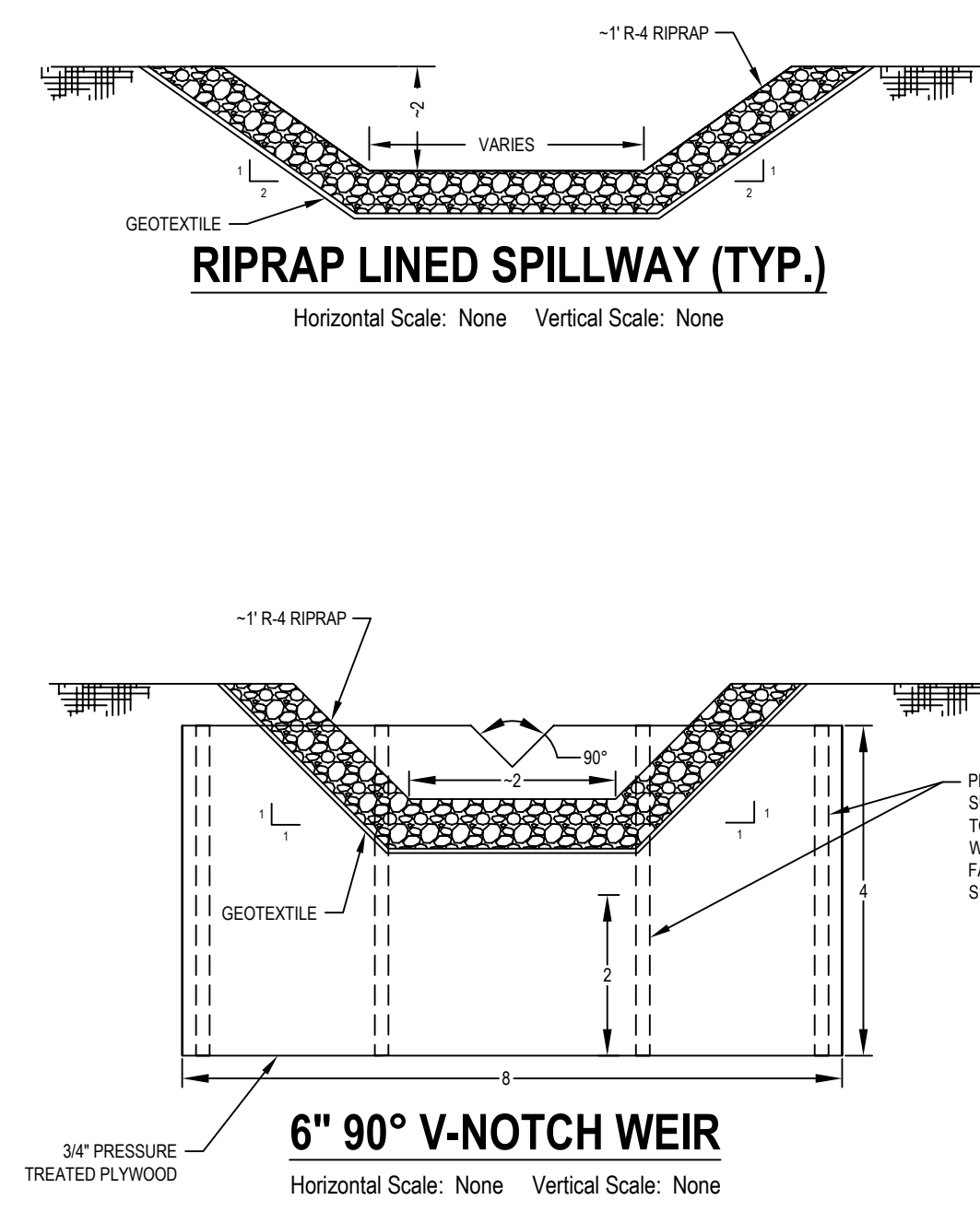
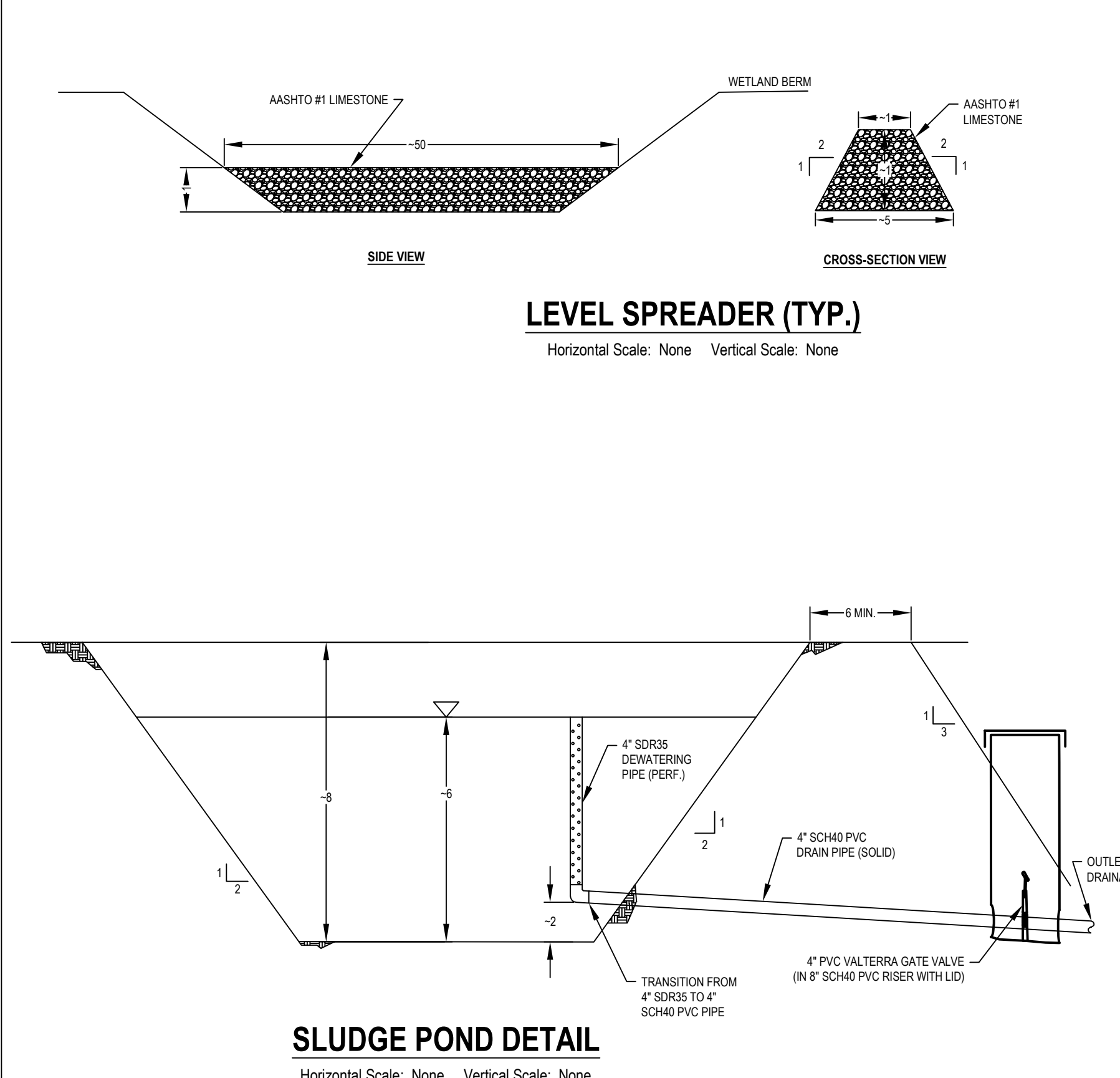
As-Built Plan



AS-BUILT PASSIVE TREATMENT SYSTEM				BUILT
COMPONENT	VOLUME (APPX.)	BOT. ELEV.	BERM ELEV.	SPILLWAY ELEV.
COLLECTION POND	200 CY	1195.5	1200.0	1197.9 (WEIR INV.)
WETLAND	205 CY	1192.6	1197.0	1193.2
SETTLING POND	170 CY	1190.0	1193.0	1191.4

Volumes in table above are representations of maximum capacity to spillway elevations. All elevations were used from GPS survey of 11/14/2022.

- GENERAL NOTES**
1. Base map contours derived from a 2006 bare-earth digital elevation model constructed from PAMAP LIDAR elevation points by PA DCNR, Bureau of Topographic and Geologic Survey [PA State Plane - South (US Survey Foot) NAD83 (Vertical datum - NAVD83)]. Select topographic and cultural features from 2006 PAMAP aerial photos obtained from www.pasda.psu.edu.
 2. All dimensions are in feet unless otherwise noted. All slope designations are H:V.
 3. The entirety of the project is located within Moraine State Park.
 4. All As-Built topographic lines are based on GPS points by BioMost Inc., Inc. using a Sub-Centimeter Grade, dual frequency JAVAD GPS unit. (Nov. 2022)
 5. This As-Built drawing is a reasonable representation of the system as constructed, field verification of actual conditions is recommended.
 6. Depression contours are denoted by dashed intermediate or index contour lines.
 7. Max sludge volume is the maximum volume of the pond to top elevation of riser. Remaining sludge volume was not measured.



- LEGEND**
- INDEX CONTOUR
 - INTERMEDIATE CONTOUR
 - AS-BUILT INDEX CONTOUR
 - AS-BUILT INTERMEDIATE CONTOUR
 - EX. SYSTEM COMPONENT
 - 4" SDR35 PERFORATED PIPE
 - 4" SDR35 SOLID PIPE
 - 4" SCH40 SOLID PIPE
 - WATER ELEVATION
 - EX. ROAD/DIVERSION DITCH
 - ROAD (DIRT)
 - GPS BENCHMARK
 - TURF REINFORCEMENT MAT

SHEET 1 OF 1

AS-BUILT

PLAN & DETAILS

BARKLEY ROAD PASSIVE TREATMENT SYSTEM

for

STREAM RESTORATION INCORPORATED

Butler County, Pennsylvania

Scale: As Shown November 2022

BioMost, Inc. Mining and Reclamation Services

Mars, PA www.biomost.com

