

Datashed: An Online Tool for Managing AMD Treatment Systems and Restoration of Impacted Watersheds

Joint Conference

**West Virginia Mine Drainage Task Force Symposium
and
15th International Mine Water Association Congress**

**April 21–26, 2024
Morgantown Event Center, WV, USA**

Presenter: Cliff Denholm, Executive Director, Stream Restoration Incorporated

Co-Authors:

Shaun Busler, BioMost, Inc.

Natalie Lamagna, Stream Restoration Incorporated

What is Datashed?

Datashed is an

- Open Source
- GIS
- Database
- Website
- Tool for Watershed Restoration
- Free to use

The screenshot shows the Datashed website interface. At the top is a dark blue navigation bar with the 'Datashed' logo and menu items: Home, Projects, Watersheds, Organizations, Map, and Get Help. The main content area features a large 'About Datashed' section with an aerial photograph of a watershed and text describing the platform as a collaborative effort for stream restoration. Below this is a 'Project Spotlight' section for the 'N. Branch Shamokin Creek' project, including a map and buttons for 'Overview', 'Documents', 'Photos', 'Sample Points', 'Water Quality Report', and 'Map'. On the right side, there is a 'Project Partners' sidebar listing various organizations such as BioMost, Inc., EPA Watershed Initiative, EPCAMR, and the USGS WRRRI Program.

www.datashed.org

Background & History

- **Coal Mining in Pennsylvania since the late 1700's**
- **Over 16 billion metric tons of coal**
- **(18 billion short tons)**



Background & History

**More than 100,000 hectares
(250,000 acres) of
abandoned mine lands in
Pennsylvania**



BACKGROUND & HISTORY

**Over 8,800 kilometers
(5,500 miles) of streams
polluted by AMD in
Pennsylvania**



Background & History

1990's Local Grassroots Watershed Groups utilizing Public-Private Partnerships and Passive Treatment to address these problems



BACKGROUND & HISTORY

- **Construction of >350 Publicly Funded Passive Treatment Systems**
- **Est. 150 billion liters (40 billion gallons) of AMD treated per year**



AN IDEA IS BORN

Slippery Rock Watershed Coalition Grove City College Student Research Project (2001)



- Before there was Google
- Students didn't know:
 - Where treatment systems were located
 - How to get to & access the treatment systems
 - What the samples points were
 - Where sample points were located
- Students didn't have maps or design drawings
- College located about 60 km (40 miles) away
- How do we get their field notes?
- How does data get managed/shared?
- Photos?



Purpose

- Facilitate water monitoring and maintenance of AMD treatment systems
- Store project information and documents related to watershed restoration efforts
- Assist organizations maintain & manage their efforts



Features/Goals

- User-friendly
- 24/7 open access to data
- Password-protected
 - Only to create/upload/edit data
- GIS-connected
 - No plug-ins needed to view GIS
- Free and Open Source Software



Datashed.org

Datashed

[Home](#) [Projects](#) [Watersheds](#) [Organizations](#) [Map](#) [Get Help](#)



About Datashed

Datashed is a collaborative effort of Stream Restoration Incorporated, Pennsylvania DEP, and others to provide the tools needed to actively monitor and maintain AMD treatment systems and manage watershed restoration efforts. No passwords are required to view or download any data on Datashed; however, passwords are required to upload or edit data. You can learn more [about Datashed here](#).

Not already a member? [Click here to sign up](#). Already a member? [Click here to login](#).

Project Partners



BioMost, Inc
Mars, Pennsylvania



EPA Watershed Initiative
Washington, District Of Columbia



EPCAMR
Ashley, Pennsylvania



Foundation for Pennsylvania Watersheds
Alexandria, Pennsylvania



NuReIm, Inc.
Pittsburgh, Pennsylvania



PA Department of Environmental Protection (PA DEP)
Harrisburg, Pennsylvania



Stream Restoration Inc.
Slippery Rock, Pennsylvania

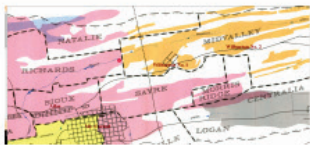


USGS WRRP Program



Western PA Coalition for Abandoned Mine Reclamation (WPCAMR)
Greensburg, Pennsylvania

Project Spotlight



N. Branch Shamokin Creek

Watershed: Shamokin Creek

Project Type Project Type Stream

City/Township Mt Carmel & Others

County Northumberland & Others

State State Pennsylvania

[Overview](#)

[Documents](#)

[Photos](#)

[Sample Points](#)

[Water Quality Report](#)

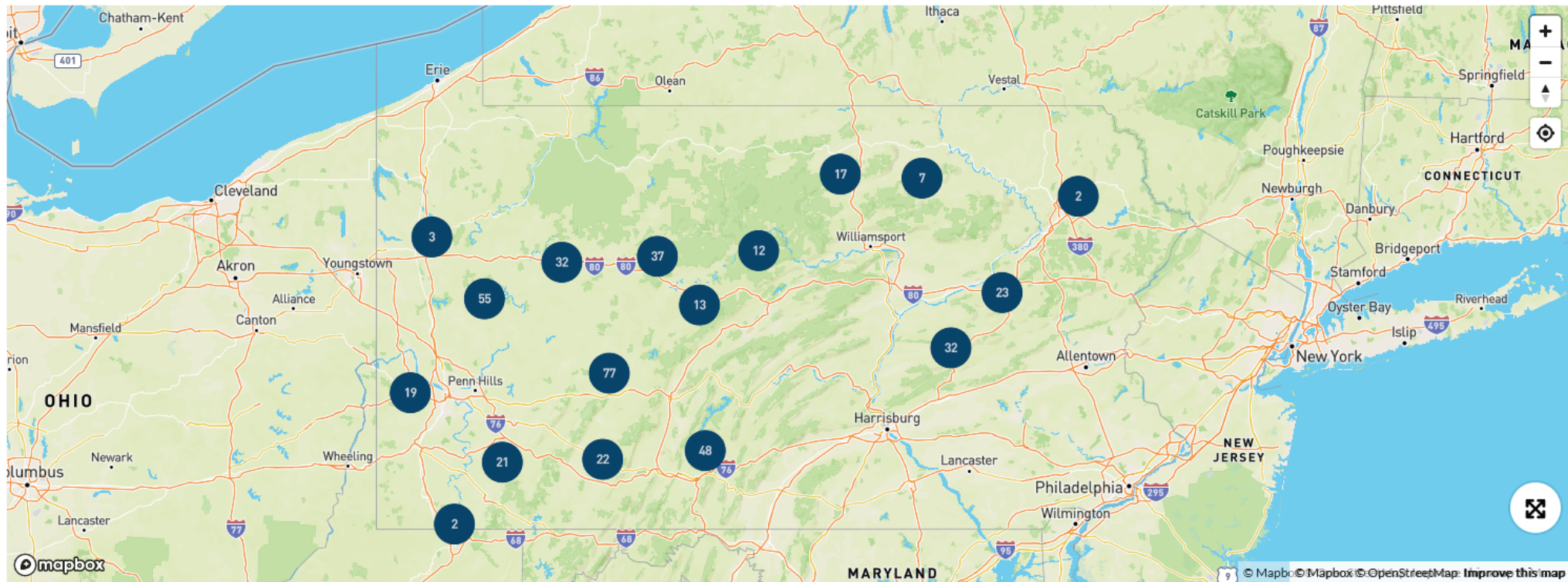
[Map](#)

PROJECTS MAP

 STREETS
 TOPOGRAPHIC
 SATELLITE

TOGGLE PROJECTS

TOGGLE SAMPLE POINTS



Projects

Click group point name to zoom to it

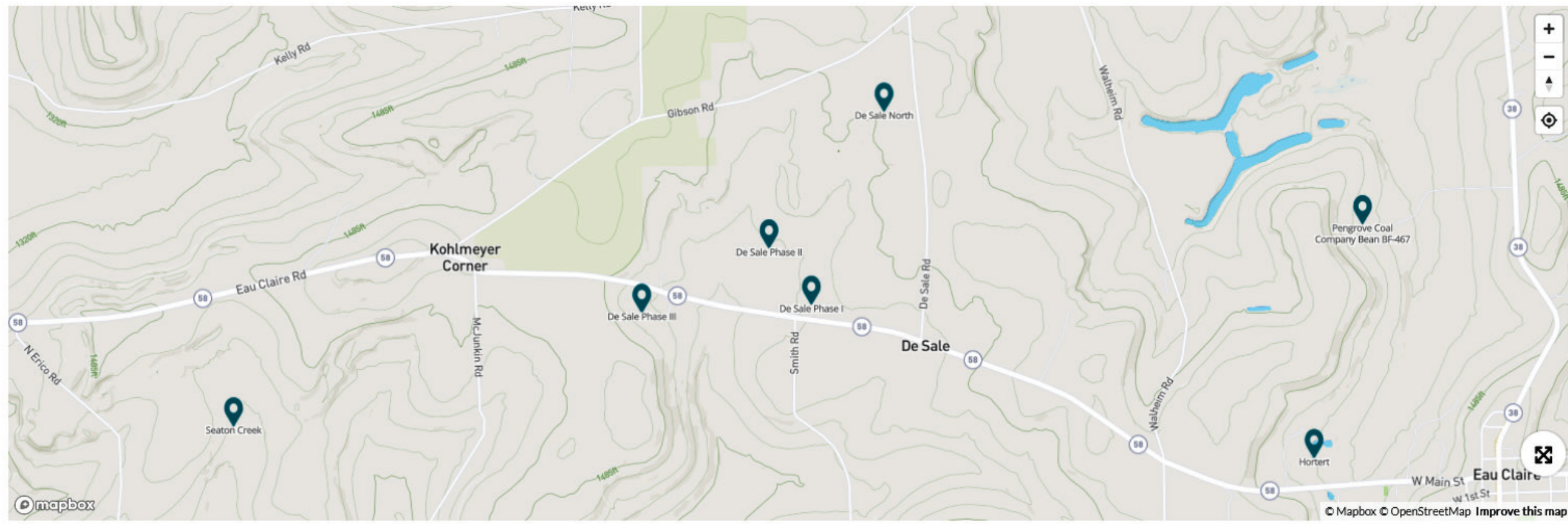
- **Alder Bog:**
 Coord: 41.217500, -79.151389
[GPS Directions](#)
- **Aluminaide:**
 Coord: 40.945370, -79.575392
[GPS Directions](#)
- **AMD & Art Vintondale:**
 Coord: 40.480278, -78.911389
[GPS Directions](#)
- **Andrews Run:**
 Coord: 40.273959, -79.703572
[GPS Directions](#)
- **Argentine Central SR115:**
 Coord: 41.096389, -79.821111
[GPS Directions](#)
- **Arnot #2 Discharge #1:**
 Coord: 41.669399, -77.129903
[GPS Directions](#)
- **Arnot #2 Discharge #2:**
 Coord: 41.670079, -77.134145
[GPS Directions](#)
- **Arnot #2 Discharge #4:**
 Coord: 41.668056, -77.143611
[GPS Directions](#)
- **Askam Borehole (aka Dundee Wetlands):**
 Coord: 41.200677, -75.966690
[GPS Directions](#)

Map Hints & Tips

- Project will only be displayed if they have a latitude and longitude set.
- Not all of the projects are displayed when zoomed out. More projects will become visible as you zoom into the map.
- Toggling off Sample Points will increase projects shown.

PROJECTS MAP

STREETS TOPOGRAPHIC SATELLITE



Map Hints & Tips

- Projects and sample points will only be displayed if they have a latitude and longitude set.
- Not all of the projects and sample points are displayed when zoomed out. More will become visible as you zoom into the map.



UP



De Sale Phase I Passive Treatment System

	Flow Field (gal/min)	pH Field (S.U.)	pH Lab (S.U.)	Alkalinity Field (mg/L)	Alkalinity Lab (mg/L)	Acidity Lab (mg/L)	T. Fe Lab (mg/L)	T. Mn Lab (mg/L)	T. Al Lab (mg/L)
raw	37	4.15	3.87	0	5	315.8	81.54	54.06	12.21
hflb	44	6.70	6.73	50.20	79	-4.5	0.95	30.60	0.44

SP1

VFP2

HFLB

CP

VFP1

Forebay

25

25

25

HFLB

WL

VFP-N

Forebay N

RAW

VFP-S

Forebay S



Argentine Central SR115

Watershed: Slippery Rock Creek
Project Type Passive Treatment System
City/Township Washington Township
County Butler
State Pennsylvania

- Overview
- Documents
- Photos
- Sample Points
- Water Quality Report
- Map



B&D Coal Company BF-462

Watershed: Sandy Creek
Project Type Passive Treatment System
City/Township Venango
County Butler
State Pennsylvania

- Overview
- Documents
- Photos
- Sample Points
- Water Quality Report
- Map



Barkley Road (Moraine) Treatment System

Watershed: Slippery Rock Creek
Project Type Passive Treatment System
City/Township Brady Township
County Butler
State Pennsylvania

- Overview
- Documents
- Photos
- Sample Points
- Water Quality Report
- Map



BC16

Watershed: Slippery Rock Creek
Project Type Passive Treatment System
City/Township Marion Township
County Butler
State Pennsylvania

- Overview
- Documents
- Photos
- Sample Points
- Water Quality Report
- Map

Project Name

Project Type

Passive Treatment System

- Any -
- Active Treatment System
- Passive Treatment System
- Land Reclamation
- Site Assessment & Restoration Plan
- Stream

State

Pennsylvania

Search

Reset

DE SALE PHASE I

Project Details

Project De Sale Phase I
 Project Type Passive Treatment System
 Project Status Good/Operational
 AMD Source Surface
 Stream Seaton Creek
 Watershed Slippery Rock Creek
 River Basin Ohio
 Quad Eau Claire, PA
 City/Township Venango Township
 County Butler
 State PA

Original Construction Year 2000
 Most Recent Rebuild Year
 Total Cost \$391,000.00
 Total Capital Cost \$0.00
 Latitude / Longitude Method Unknown
 Latitude 41.142500
 Longitude -79.830000
 Elevation 1400

Description: A passive treatment system was installed to treat an abandoned mine discharge emanating from an abandoned surface mine following land reclamation with alkaline circulating fluidized bed coal ash.

Water Quality Data Summary

	Flow Field (gal/min)	pH Field (S.U.)	pH Lab (S.U.)	ORP Field (mvolts)	DO Field (mg/L)	Temp Field (C)	Cond Lab (umhos/cm)	Alkalinity Field (mg/L)	Alkalinity Lab (mg/L)	Acidity Lab (mg/L)	T. Fe Lab (mg/L)	D. Fe Lab (mg/L)	T. Mn Lab (mg/L)	D. Mn Lab (mg/L)	T. Al Lab (mg/L)	D. Al Lab (mg/L)	SD4 Lab (mg/L)	TSS Lab (mg/L)
RAW	37	4.15	3.87	307	0.36	11.0	1,760	0	5	315.8	81.54	87.95	54.06	53.03	12.21	15.96	1,205.1	25.6
HFLB	44	6.70	6.73	169	6.83	13.9	1,604	50.20	79	-4.5	0.95	0.14	30.60	32.60	0.44	0.15	1,129.3	6.4

Treatment Technologies

Treatment Technology	Quantity	Status
Aerobic Wetland	1	N/A
Forebay	1	N/A
Horizontal Flow Limestone Bed (HFLB)	1	N/A
Settling Pond	1	N/A
Vertical Flow Pond (VFP)	2	N/A



Location Links

Map
 GPS Directions

Project Contacts

Contact Person: cdenholm

Contact Organization: Stream Restoration Inc.

Project Designer: Tim Danehy

Project Designer Organization: BioMost, Inc

Project Responsible Organization: Stream Restoration Inc.

Funding

Title	Source	Amount	Date
PA DEP Other	PA DEP Other	\$391,000.00	

Organizations

Name	Website
Amerikohl Mining Inc.	Visit Website
BioMost, Inc	Visit Website
G & C Coal Analysis Lab	
Slippery Rock Watershed Coalition	Visit Website
Stream Restoration Inc.	Visit Website

External System IDs

Title	System
D1-23	Datashed 1.0
PA-113	OSM

Project Performance

Water Treated	22,889,880 (gal/yr)
Alkalinity Load to Stream	13,830 (lb/yr)
Load Reductions	
Acidity	46,227 (lb/yr)
Manganese (Total)	3,183 (lb/yr)
Aluminum (Total)	1,845 (lb/yr)
Iron (Total)	11,041 (lb/yr)

DE SALE PHASE I

Project Details

Project De Sale Phase I
 Project Type Passive Treatment System
 Project Status Good/Operational
 AMD Source Surface
 Stream Seaton Creek
 Watershed Slippery Rock Creek
 River Basin Ohio
 Quad Eau Claire, PA
 City/Township Venango Township
 County Butler
 State PA

Original Construction Year 2000
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 Total Capital Cost \$0.00
 Latitude / Longitude Method Unknown
 Latitude 41.142500
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Water Quality Data Summary

	Flow Field (gal/min)	pH Field (S.U.)	pH Lab (S.U.)	ORP Field (mvolts)	DO Field (mg/L)	Temp Field (C)	Cond Lab (umhos/cm)	Alkalinity Field (mg/L)	Alkalinity Lab (mg/L)	Acidity Lab (mg/L)	T. Fe Lab (mg/L)	D. Fe Lab (mg/L)	T. Mn Lab (mg/L)	D. Mn Lab (mg/L)	T. Al Lab (mg/L)	D. Al Lab (mg/L)	SO4 Lab (mg/L)	TSS Lab (mg/L)
RAW	37	4.15	3.87	307	0.36	11.0	1,760	0	5	315.8	81.54	87.95	54.06	53.03	12.21	15.96	1,205.1	25.6
HFLB	44	6.70	6.73	169	6.83	13.9	1,604	50.20	79	-4.5	0.95	0.14	30.60	32.60	0.44	0.15	1,129.3	6.4



Location Links

[Map](#)
[GPS Directions](#)

Project Contacts

Contact Person: [cdenholm](#)




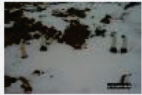


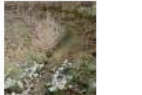
Contact Organization: [Stream Restoration Inc.](#)

Project Designer: Tim Danehy

Project Designer Organization: [BioMost, Inc](#)

Project Responsible Organization: [Stream Restoration Inc.](#)

Sample Points

Sample Point	Aliases	Photo	ID's	Inflow	Outflow	Years Monitored	Description	Audience	Edit	Delete
RAW				Yes	No		Raw water flowing out of collection system and into forebay.	Manage Audience		
Forebay N				No	No		Effluent of Forebay prior to entering northern Vertical Flow Pond (VFPN).	Manage Audience		
Forebay S				No	No		Effluent of Forebay before flowing into southern Vertical Flow Pond (VFPS).	Manage Audience		
VFP-N				No	No		Composite of effluent pipes from the northern Vertical Flow Pond.	Manage Audience		
VFP-S				No	No		Composite of effluent of southern Vertical Flow Pond (sample taken in spillway).	Manage Audience		
WL				No	No		Effluent of wetland taken at top of spillway.	Manage Audience		
HFLB				No	Yes		Effluent of HFLB.	Manage Audience		
25		N/A		No	No		Unnamed tributary to Seaton Creek downstream of De Sale Phase 1 taken upstream of SR-58.	Manage Audience		

Title

Inflow Outflow

Search

Water Quality Data Report

Sample Point - Forebay N

[Download Sample Point Report CSV](#) / Inflow: No / Outflow: No

Date	Method of Flow	Flow - Field (gal/min)	pH - Field (S.U.)	pH - Lab (S.U.)	ORP - Field (mvolts)	DO - Field (mg/L)	Temp - Field (C)	Cond - Lab (umhos/cm)	Alkalinity - Field (mg/L)	Alcalinity - Lab (mg/L)	Acidity - Lab (mg/L)	T. Fe - Lab (mg/L)	D. Fe - Lab (mg/L)	T. Mn - Lab (mg/L)	D. Mn - Lab (mg/L)	T. Al - Lab (mg/L)	D. Al - Lab (mg/L)
2006-02-09	--	--	3.85	3.64	--	--	3	1078	--	--	94.07	2.85	2.44	23.62	23.48	10.9	10.92
2006-03-08	--	--	3.54	3.37	--	--	6	1472	--	--	195.71	37.97	37.5	36.74	34.43	7.64	7.37
2008-08-06	--	10	3.18	3.02	496	5.90	23.4	1807	0	0	254.52	22.36	--	51.89	--	15.21	--
2008-11-12	--	1	2.95	3.06	--	10.62	6.6	2174	0	0	331.95	49.45	--	54.35	--	13.00	--
2009-03-31	--	25	3.61	3.26	--	8.57	12.1	1403	0	0	137.51	29.85	--	31.07	--	8.44	--
2009-06-25	--	11	3.39	3.30	421	7.22	22.8	1497	0	0	180.29	22.77	--	37.35	--	9.49	--
2009-09-16	--	5	3.08	3.09	505	7.51	22.8	1704	0	0	215.00	22.94	--	42.97	--	11.82	--
2009-12-14	--	10	3.36	3.06	465	8.06	8.5	2020	0	0	283.61	68.33	--	48.74	--	10.86	--
2010-04-15	--	10	3.59	3.06	448	6.08	15.8	1668	0	0	138.77	45.15	--	37.51	--	7.76	--
2015-05-07	--	32	3.62	3.38	402	8.7	19	1519	0	0	178.05	44.94	--	28.04	--	8.07	--
2020-06-01	Bucket	33	3.32	3.21	452	7.27	17.3	1074	0	0	105.99	15.03	--	20.25	--	4.45	--
Minimum:	0	1	2.95	3.02	402	5.90	3	1074	0	0	94.07	2.85	2.44	20.25	23.48	4.45	7.37
Maximum:	0	33	3.85	3.64	505	10.62	23.4	2174	0	0	331.95	68.33	37.5	54.35	34.43	15.21	10.92
Average:	0	15	3.41	3.22	456	7.77	14.3	1,583	0	0	192.3	32.88	19.97	37.50	28.96	9.79	9.15
Range:	0	32	0.9	0.62	103	4.72	20.4	1100	0	0	237.88	65.48	35.06	34.1	10.95	10.76	3.55
Median:	0	10	3.39	3.21	452	7.51	15.8	1519	0	0	180.29	29.85	19.97	37.35	28.96	9.49	9.15
Loading (lb/day):									--	--	30.44	5.95	--	5.88	--	1.51	--

Sample Point Description: Effluent of Forebay prior to entering northern Vertical Flow Pond (VFPN).

Documents & Downloads

Manage audience for all documents

Title

File Type

- Aerial Photo
- As-Built
- Design Drawings
- Executive Summary
- General
- Map
- O&M Form
- O&M Plan Instructions

Sort by

Order

Apply

As-Built

Title	File Type	Audience	Edit	Delete
De Sale Phase I As-Built	As-Built	Manage Audience		

Executive Summary

Title	File Type	Audience	Edit	Delete
De Sale Phase I Restoration Project Fact Sheet	Executive Summary	Manage Audience		

Map

Title	File Type	Audience	Edit	Delete
De Sale Phase I Map	Map	Manage Audience		

O&M Form

Title	File Type	Audience	Edit	Delete
De Sale Phase I O&M Form	O&M Form	Manage Audience		


O&M Plan Instructions

Title	File Type	Audience	Edit	Delete
SRWC O&M Manual	O&M Plan Instructions	Manage Audience		

Reports

Title	File Type	Audience	Edit	Delete
De Sale O&M TAG Report 2	Reports	Manage Audience		
DeSale 1 O&M TAG 1 Report	Reports	Manage Audience		

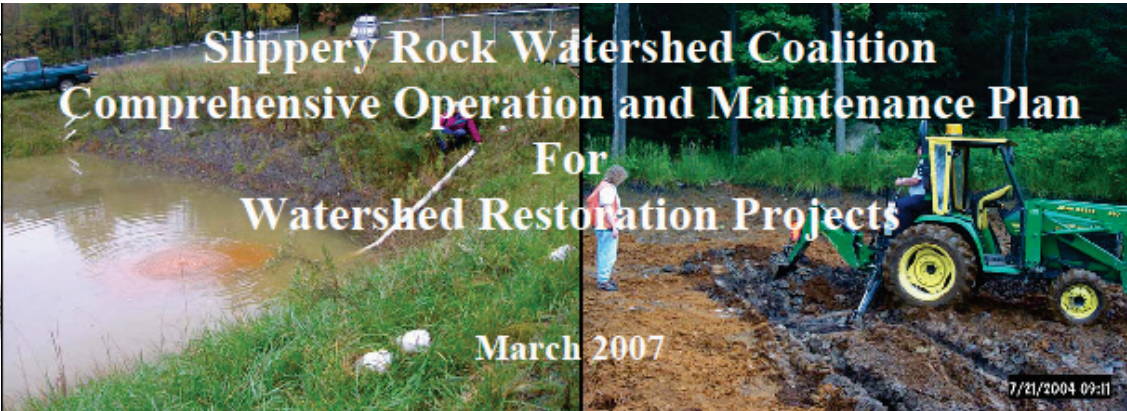
DOCUMENTS



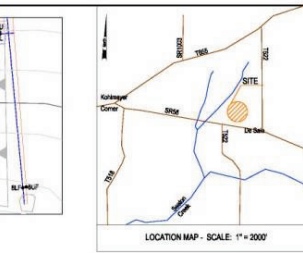
NOTES:
 These maps prepared from LIDAR survey
 An AS-BUILT LIDAR survey by Earthsoft, Inc.
 provided by American Mining, Inc. and
 settling pond and wetland surface area
 Water service pipe location and size
 Water surface area and elevations as
 per aerial photos and other data on
 Wetland planting completed by volume

Slippery Rock Watershed Coalition Comprehensive Operation and Maintenance Plan For Watershed Restoration Projects


March 2007




7/21/2004 09:11



LOCATION MAP - SCALE: 1" = 200'




Prepared by
 BioMost, Inc. and Stream Restoration Incorporated



Funding Provided By A
 PA DEP Growing Greener
 Technical Assistance Grant

6/18/2001 17:24



6/18/2001 17:24

LEGEND

- PASSIVE SYSTEM COMPONENT
- CONTOUR - INDEX
- CONTOUR - INTERMEDIATE
- WATER
- PROPERTY LINE
- TRAILLINE
- UTILITY LINE (ELECTRIC, TELEPHONE)
- UTILITY POLE
- PAVED/IMPROVED ROAD
- UNIMPROVED ROAD
- TRAILS
- OUT BUILDING OR OTHER STRUCT.
- DESIGN DISCHARGE POINT
- 4" PVC SCH 40 SOLID (UPPER TIER)
- 4" PVC SCH 40 PERFORATED (UPPER TIER)
- 4" PVC SCH 40 SOLID (UPPER TIER) - OVERFLOW
- 4" PVC SCH 40 SOLID (LOWER TIER)
- 4" PVC SCH 40 PERFORATED (LOWER TIER)
- 4" PVC SCH 40 SOLID (LOWER TIER) - OVERFLOW
- 4" PVC SCH 40 PPE (SOLID)
- 4" PVC SCH 40 PPE (SOLID)
- 4" PVC SCH 40 PERFORATED
- 4" PERFORATED 16-12 PIPE
- 4" PERFORATED 16-12 PIPE
- RFP RAY (R-4) SPL. WAYCHANNEL
- MARKED SURVEY POINT WITH SURFACE ELEV.
- AS-BUILT CROSS SECTION
- PIPE QUADRANT NUMBER

SHEET 1 OF 2

REVIEWED BY

AS-BUILT PLAN
 DE SALE RESTORATION AREA
 PHASE I

Slippery Rock Watershed Coalition
 STREAM RESTORATION INCORPORATED
 a division of
 Venango Township
 Butler County, PA
 Scale: 1" = 30' Date: 6/2000
 BioMac, Inc., Chatham Twp., PA

Master Project Report

[EXPORT RAW DATA TO CSV](#)

Report loading completed!

Title	Project Type	OSM ID	AMLIS ID	Latitude	Longitude	Stream	Watershed	River Basin	Township	County	Province	Quad	AMD Source	Construction Year	Total Cost	Total Capital Cost	Allegheny County Airport Authority
Alder Bog	Passive Treatment System	PA-209		41.217500	-79.151389		Little Mill Creek	Allegheny	Eldred	Jefferson	PA	Corsica	AMD surface	1991	13400.00	0.00	
Aluminaide	Passive Treatment System		PA000304	40.945370	-79.575392	UNT to Huling Run	Huling Run	Allegheny	Washington Township	Armstrong	PA	East Brady	AMD Underground	2017	210148.46	151655.00	
AMD & Art Passive Treatment System - Not In Operation	Passive Treatment System	PA-33		40.480278	-78.911389	South Branch Blacklick Creek	Blacklick Creek	Kiski-Conemaugh	Vintondale	Cambria	PA	Vintondale	AMD Underground	2003	216500.00	285000.00	
Andrews Run	Passive Treatment System			40.273959	-79.703572	UNT to Andrews Run	Sewickley Creek	Monongahela	Sewickley Township	Westmoreland	PA	Latrobe, PA	AMD surface	2024	182782.00	0.00	
Argentine Central SR115	Passive Treatment System	PA-182		41.096389	-79.821111	Slippery Rock Creek	Slippery Rock Creek	Ohio	Washington Township	Butler	PA	Hillards	AMD Underground	2001	31000.00	0.00	
Arnot #2 Discharge #1	Passive Treatment System	PA-229		41.669399	-77.129903		Tioga River	Susquehanna	Bloss	Tioga	PA	Cherry Flats	AMD Underground	2004	371501.00	0.00	
Arnot #2 Discharge #2	Passive Treatment System	PA-88		41.670079	-77.134145		Tioga River	Susquehanna	Bloss	Tioga	PA	Cherry Flats	AMD Underground	2001	388837.00	388837.00	

What is the Value of Datashed?

Watershed Groups & Nonprofits

- Provides data management for groups to store their data
 - Don't have to “reinvent the wheel”
- Easy access to data & documents
 - Not stored on someone's home computer
- Data backed up daily
- Education/Outreach
 - Each project has a web page
 - Community has access to info



What is the Value of Datashed?

Government and Funding Agencies

- Central location for the management of restoration projects and related data
- “One-stop-shop” to gather data for reporting program success
 - GG, 319, Foundation for PA Watersheds



What is the Value of Datashed?

Researchers, Students, Designers

- Single, largest-known, publicly-available repository of data related to passive treatment systems
- World-wide access
- Searchable by treatment technology
- Information for maintenance and rehabilitation projects





Questions?

sri@streamrestorationinc.org

Visit our websites for additional information & resources
www.streamrestorationinc.org
www.datashed.org