43rd West Virginia Mine Drainage Task Force Symposium

Project Background and Development for the Little Conemaugh Mine Drainage Treatment Plant Project, Portage Township, Cambria County, Pennsylvania

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Tetra Tech, Inc., Pittsburgh, PA

April 17, 2025

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LCMDTP Project – Items to be Covered

- Project Location and Project Background
- Other LC Watershed Projects Completed to Date
- Mining History, Mines, and Discharges Involved in the Project
- Goals and Objectives of the LCMDTP Project
- Design Criteria for the LCMDTP
- Conceptual Treatment Plant Layout
- Challenges, Project Status, and Project Schedule
- Project Stakeholders and Partners

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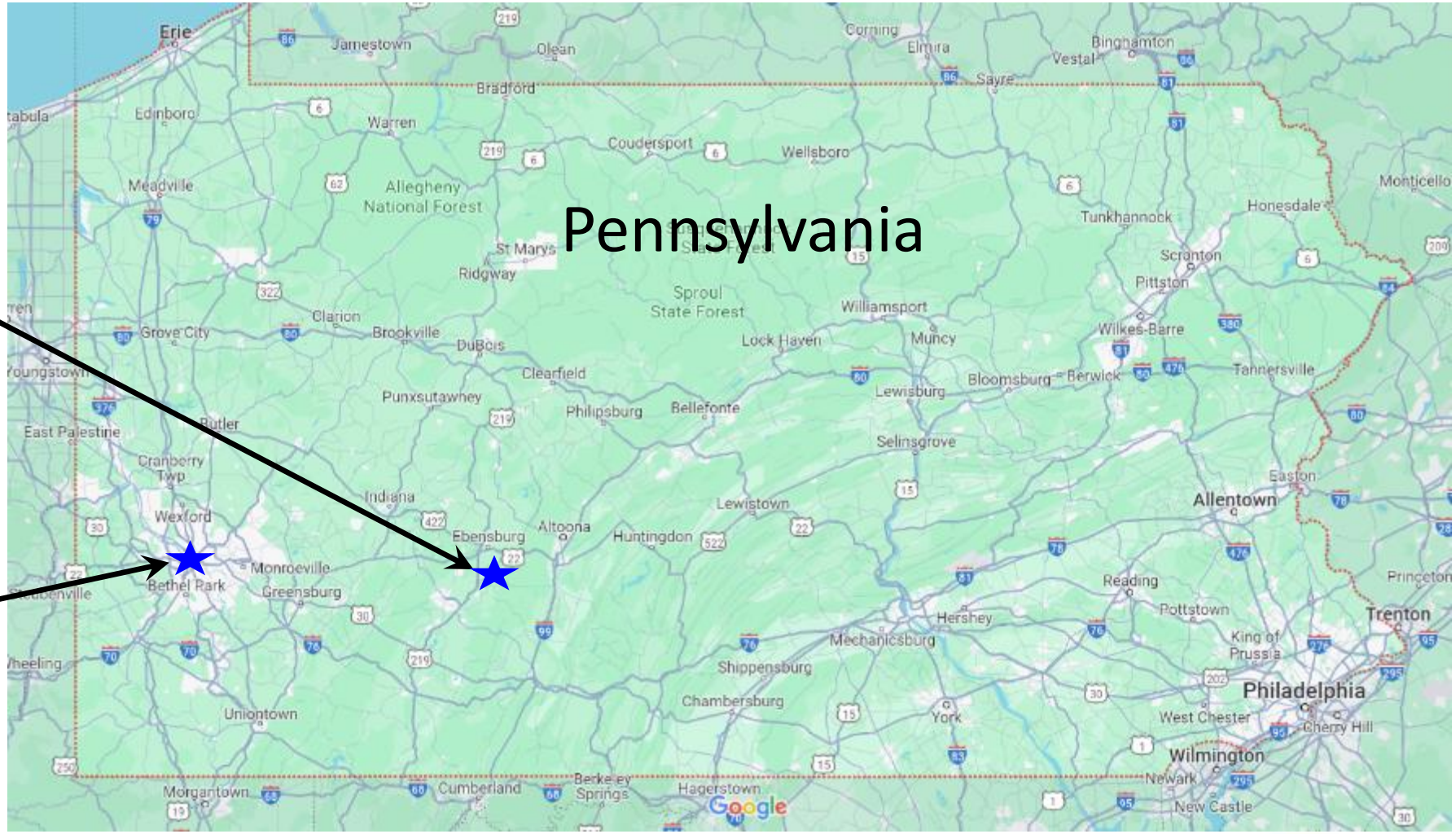
Little Conemaugh MDTP Project Location

Little Conemaugh Mine Drainage Treatment Plant Project Location

Pittsburgh, PA



Source: Google Maps

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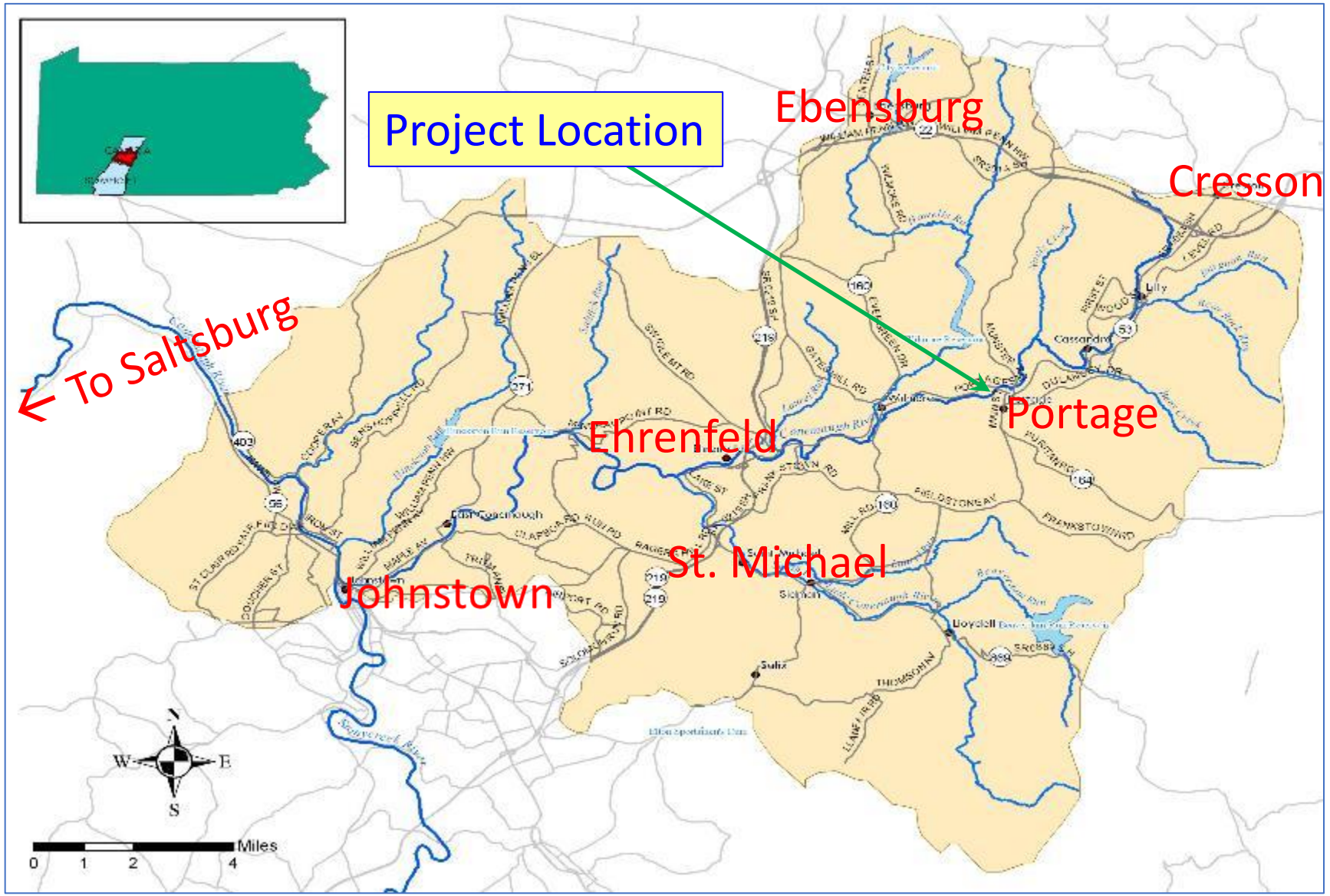
Little Conemaugh River Watershed



The Little Conemaugh River is 29 miles long and drains 188 square miles.

It joins the Stonycreek River in Johnstown to form the Conemaugh River, which flows 52 miles before emptying into the Kiskiminetas River at Saltsburg.

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The "Super Seven" Discharges

- A Little Conemaugh Assessment was published by the Stonycreek – Conemaugh River Improvement Project (SCRIP) in **1995** and was entitled **"Report on the Water Quality and Acid Mine Drainage in the Little Conemaugh River Watershed Cambria County, Pennsylvania"**.
- This study was the first comprehensive study of the Little Conemaugh River watershed, and it led to the understanding that seven (7) large underground mine discharges (the "Super Seven") were responsible for 80-90% of the AMD pollution load and that meaningful watershed restoration would need to focus upon conventional treatment of these large discharges.

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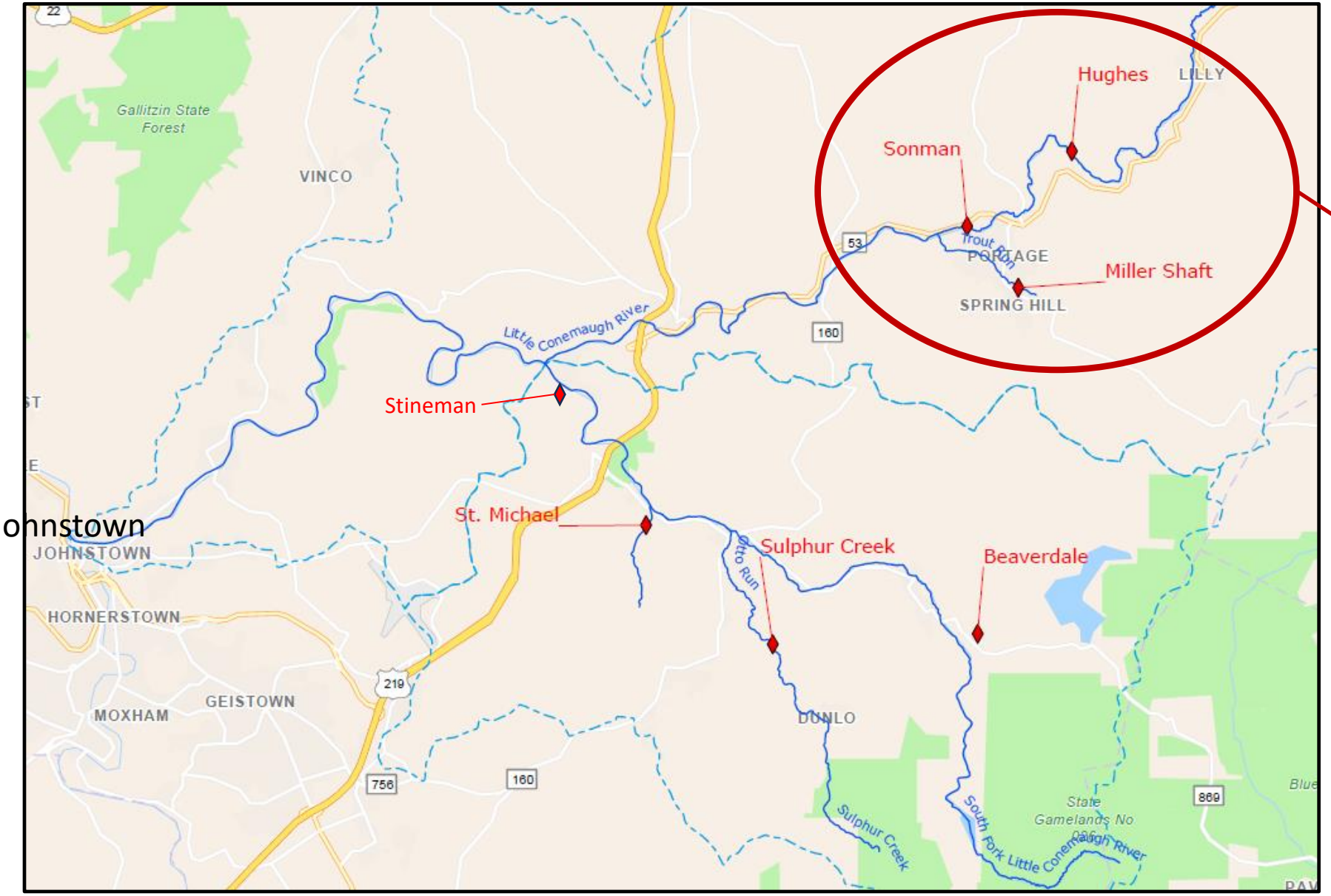
The "Super Seven" Discharges



Discharges included in the Little Conemaugh Mine Drainage Treatment Plant Project.

Note: Many Photos and graphics in this presentation were taken from the project RFP or provided by OSMRE, PA DEP, or Foundation for Pennsylvania Watersheds (FPW)

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Little Conemaugh River In Johnstown

Source:
Wikimedia Commons

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Significant Previously Completed Projects in the Little Conemaugh River Watershed

- Rosebud St. Michael AMD Treatment Plant
  (Addressed one of the "Super Seven" Discharges)
- Ehrenfeld Coal Refuse Pile Reclamation Project
- Stineman "Path of the Flood" Coal Refuse Pile Reclamation Project

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Rosebud – St. Michael Mine Drainage Treatment Plant

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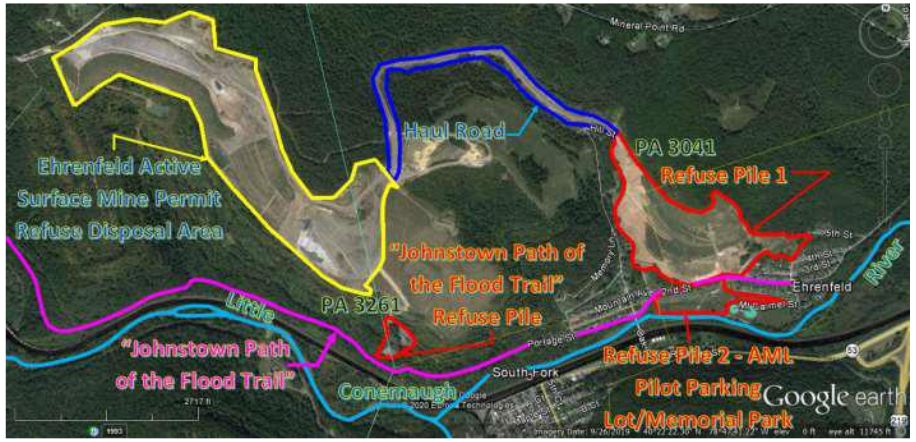
Ehrenfeld Coal Refuse Pile Reclamation Project



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Ehrenfeld Coal Refuse Pile Reclamation Project

BEFORE

AFTER

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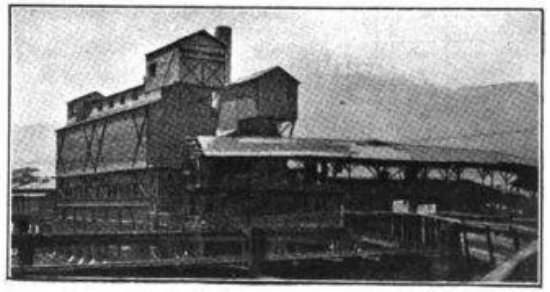
Stineman Coal Refuse Pile Reclamation Project

PROJECT START DATE: April 9, 2019
PROJECT COMPLETION DATE: October 31, 2021
PROJECT COST: $2,045,591.40

Mining History

- The first large-scale mining in Cambria County occurred in 1856, when the newly formed Cambria Iron Company opened the Rolling Mill Mine in Johnstown.
- By 1885, nearly two dozen mines were operating in Cambria County, producing a bit more than a million tons of coal.
- Additional large-scale coal producers of the late 1800s include the C.A. Hughes & Company (1880), operating between Lilly and Cassandra; the Taylor & McCoy Coal & Coke Company (1881) near Gallitzin, which in addition to mining also constructed 240 coke ovens; and the Sonman Shaft Coal Company (1883), which was near Portage.
- By 1901 there were 130 significant coal mines in the county.



ABANDONED COAL TIPPLE OF ROLLING MILL MINE
This structure was used until April, 1922, after which the coal produced in the mine was dumped down the Elk Run shaft to be loaded into mine cars and hauled to Rosedale, where it is hoisted and conveyed to coke ovens.
Coal Age, Aug. 1922

Historic Photos of the Rolling Mill Mine

Photos Source: Portage Area Historical Society

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Mines and Discharges Involved in the Little Conemaugh MDTP Project

- **Sonman Slope Mine**: Upper Freeport / "E" seam
  - Relevance: Mine discharges to the D11, D12, and D13 Boreholes
- **C.A. Hughes Mine**: Lower Kittanning / "B" seam
  - Relevance: Mine discharges to the Hughes Borehole
- **Portage No.2/No.4 Mine**: Middle Kittanning / "C prime" seam
  - Relevance: Mine discharges to the Miller Shaft
- **Sonman Shaft No.2 Mine**: Lower Kittanning / "B" seam
  - Relevance: Candidate for sludge injection

Youngest

- Upper Freeport or E seam
- Lower Freeport or D seam
- Upper Kittanning or C' seam (C prime)
- Middle Kittanning, or C seam
- Lower Kittanning or B seam

Oldest

Coal Seam Designations and Relationship

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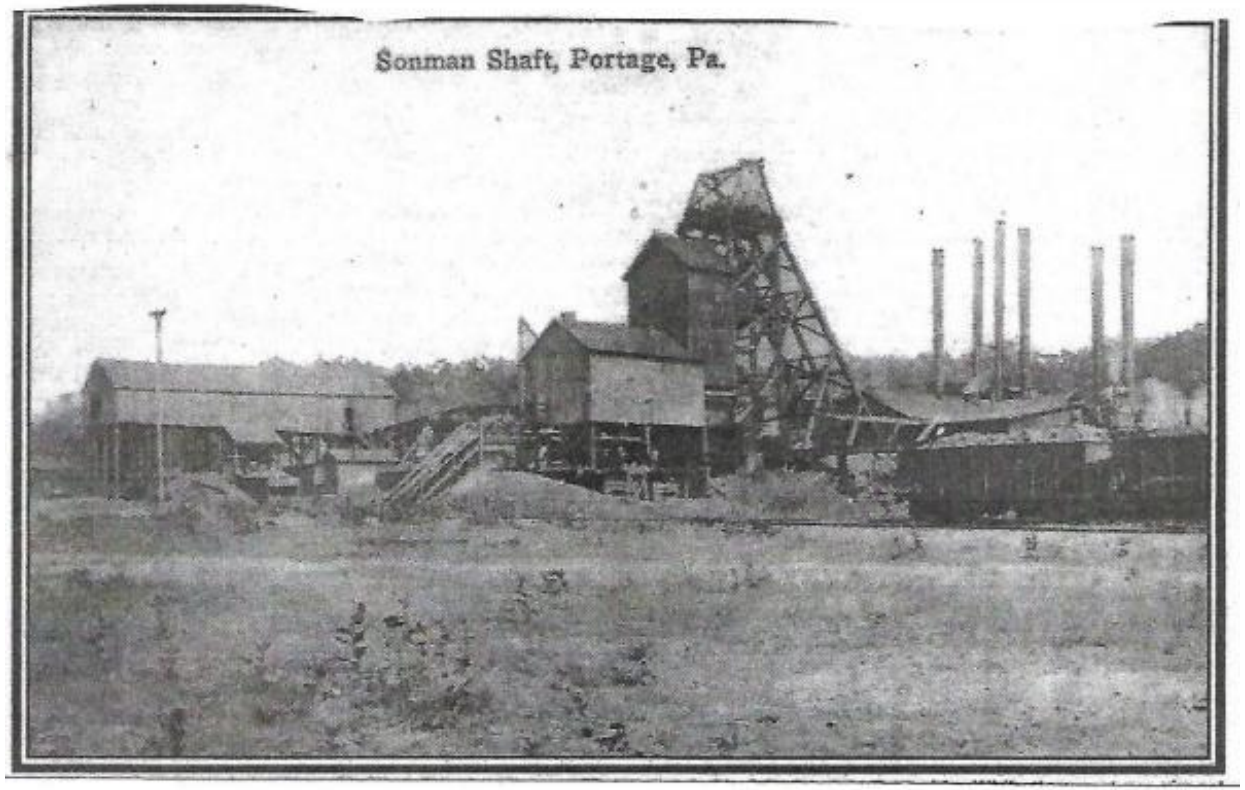
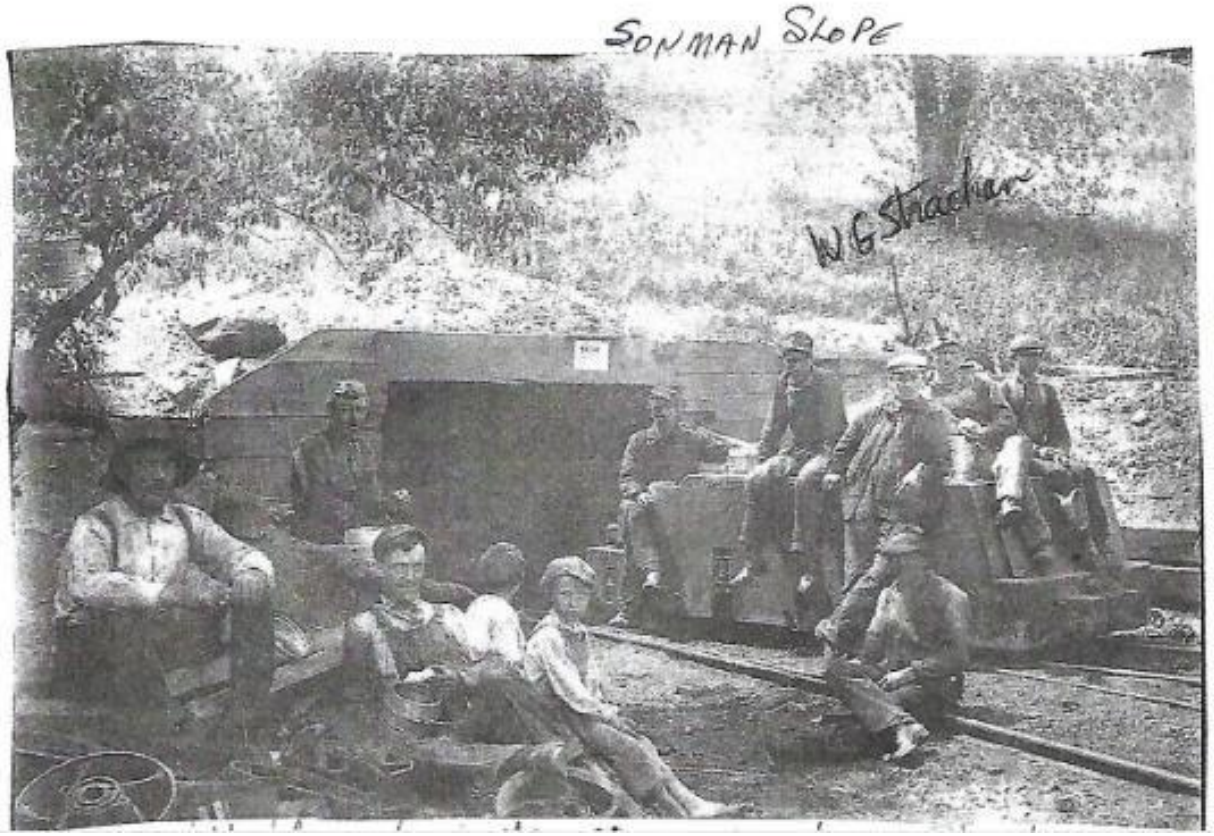
Mining History

Historic Photos of the Sonman Shaft and Sonman Slope Mines near Portage, PA





Source: Portage Area Historical Society

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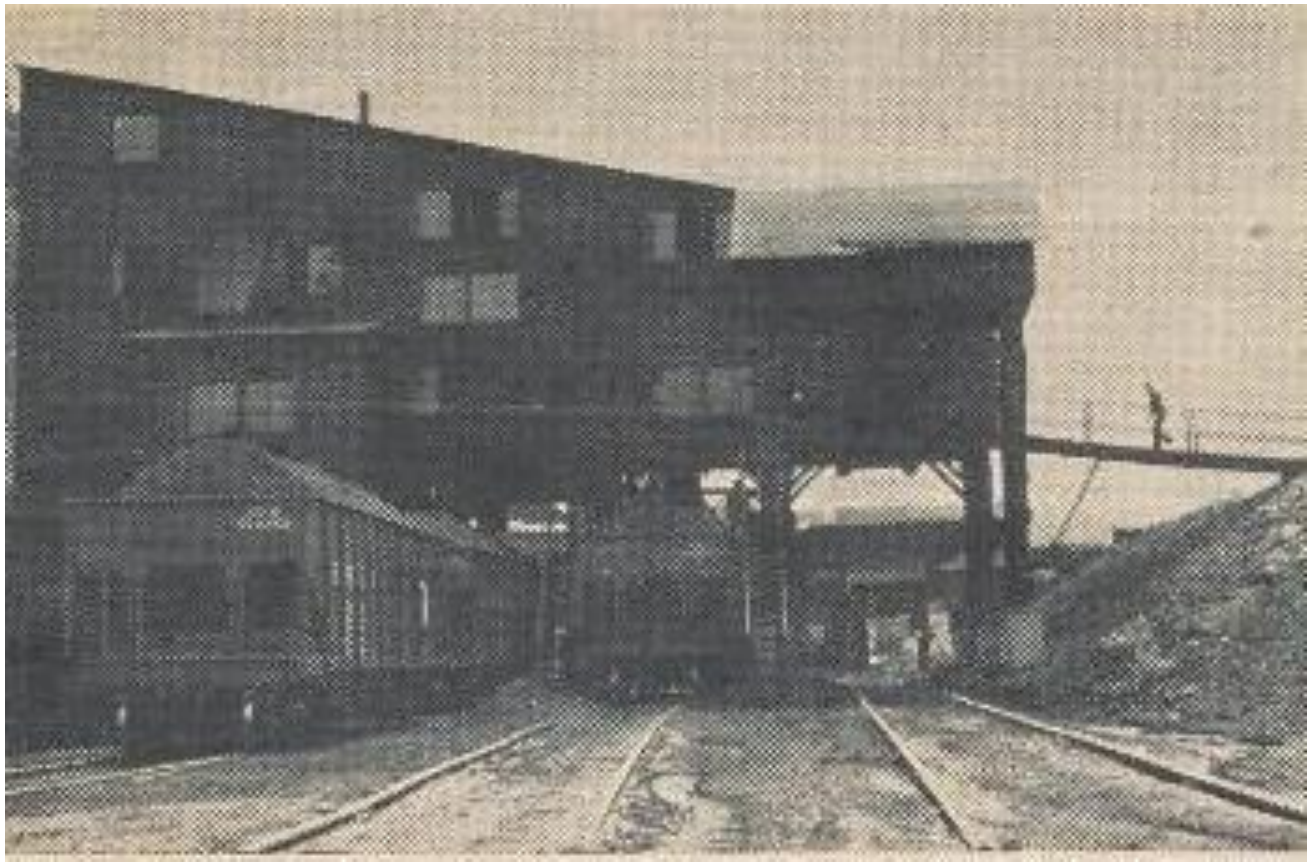
Mining History

Historic Photos of the Miller Shaft and CA Hughes Mines



Source: Portage Area Historical Society –*The Mine Post, June 1951*

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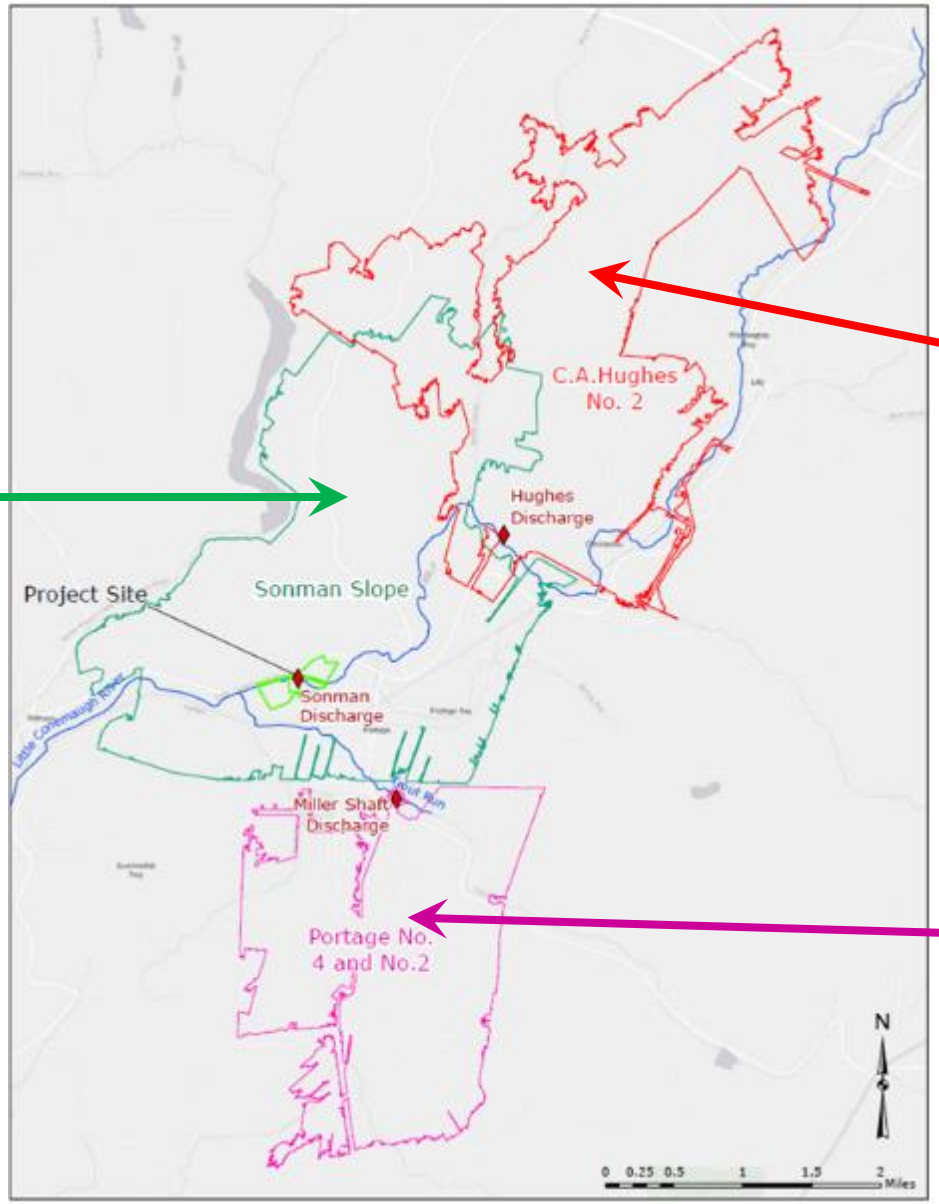
Mines Involved in the Project



C.A. Hughes Mine No. 2

Sonman Slope Mine

Sonman Shaft Mine is below The Sonman Slope Mine

Portage No. 2 and No. 4 Mines

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Discharges Included in the Project

Formal Name	Common Name
Portage No.2/No.4	Miller Shaft
C.A. Hughes Borehole	Hughes Borehole
D11	Sonman Power Borehole
D12	Sonman Water Borehole
D13	Sonman Discharge

Note: The D11, D12, and D13 are collectively referred to as the Sonman Discharges

Miller Shaft AMD Discharge

Miller Shaft Water Quality						
	pH	Al	Fe	Mn	Sulfate	Acidity
Max	6.30	4.64	35.05	2.76	544.60	58.80
Min	5.60	2.10	21.36	1.87	362.70	20.60
50th percentile	6.00	2.96	30.70	2.38	457.40	39.20
Average	5.95	2.97	29.97	2.37	459.00	39.24

All expressed in mg/L, Acidity as mg/L as $CaCO_3$

Statistics Generaged from N=33 dataset from 2003 to 2022

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Miller Shaft AMD Discharge

Miller Shaft Flow (gpm)									
	MFF	0%	25%	50%	75%	90%	100%	Average	N
Miller Shaft	856-945	500	839	1072	1384	1618	3708	1106	6128
*MMF = Most Frequent Flow from Histogram Analysis									

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Hughes Borehole AMD Discharge

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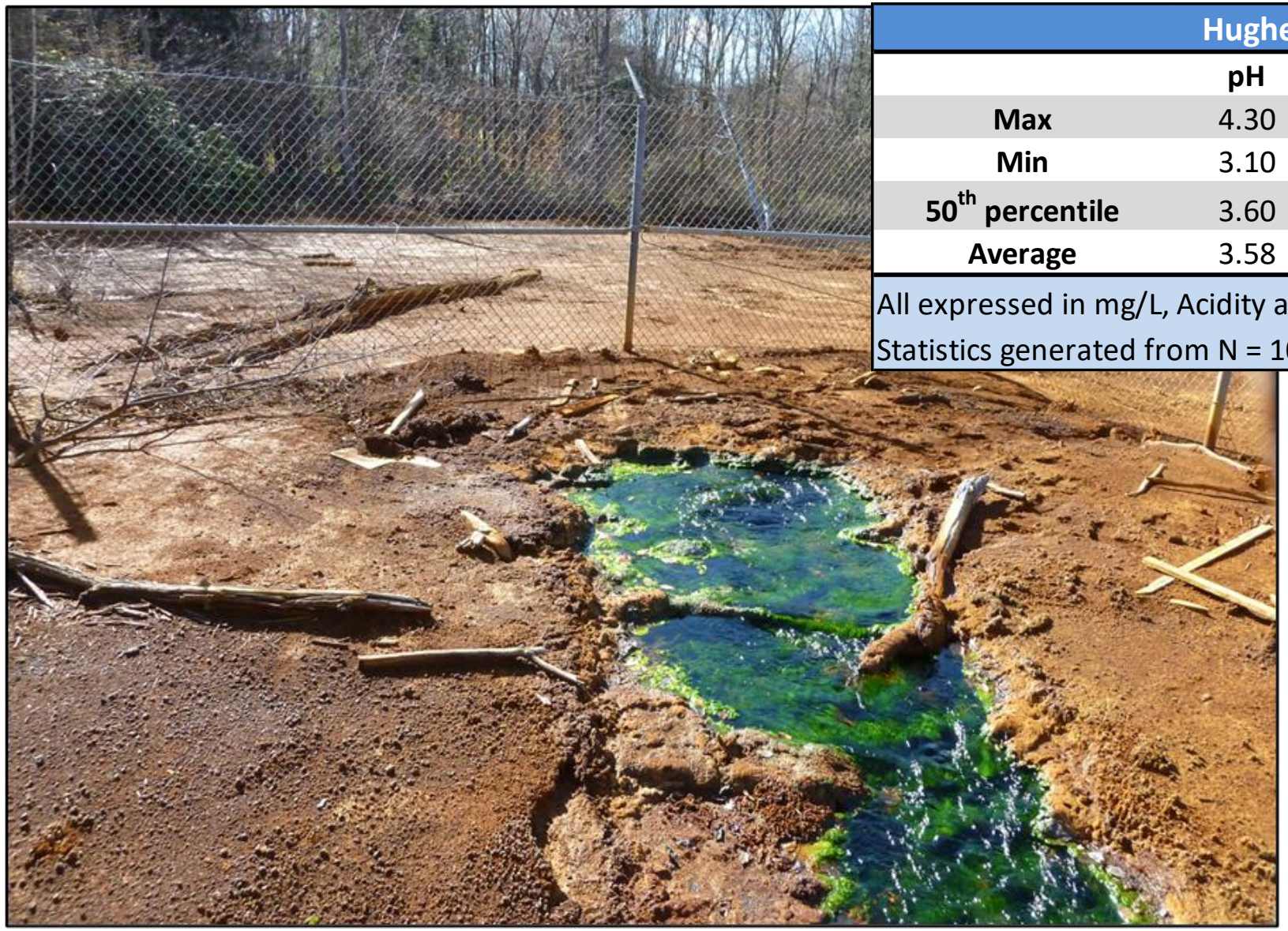
Hughes Borehole AMD Discharge



Hughes Borehole Water Quality						
	pH	Al	Fe	Mn	Sulfate	Acidity
Max	4.30	24.2	134.8	6.12	1081.00	339.40
Min	3.10	6.672	2.29	1.98	360.80	81.40
50^{th} percentile	3.60	10.26	81.8	2.739	584.20	207.00
Average	3.58	11.738	69.171	3.092	596.28	213.10

All expressed in mg/L, Acidity as mg/L as $CaCO_3$

Statistics generated from N = 100 data set

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Hughes Borehole AMD Discharge

Hughes Borehole Flow (gpm) Percentiles								
	MFF	0%	25%	50%	75%	90%	100%	Average
Hughes	724-826	210	620	840	1120	1840	2160	944
*MMF = Most Frequent Flow from Histogram Analysis						Total Flow Samples =		951

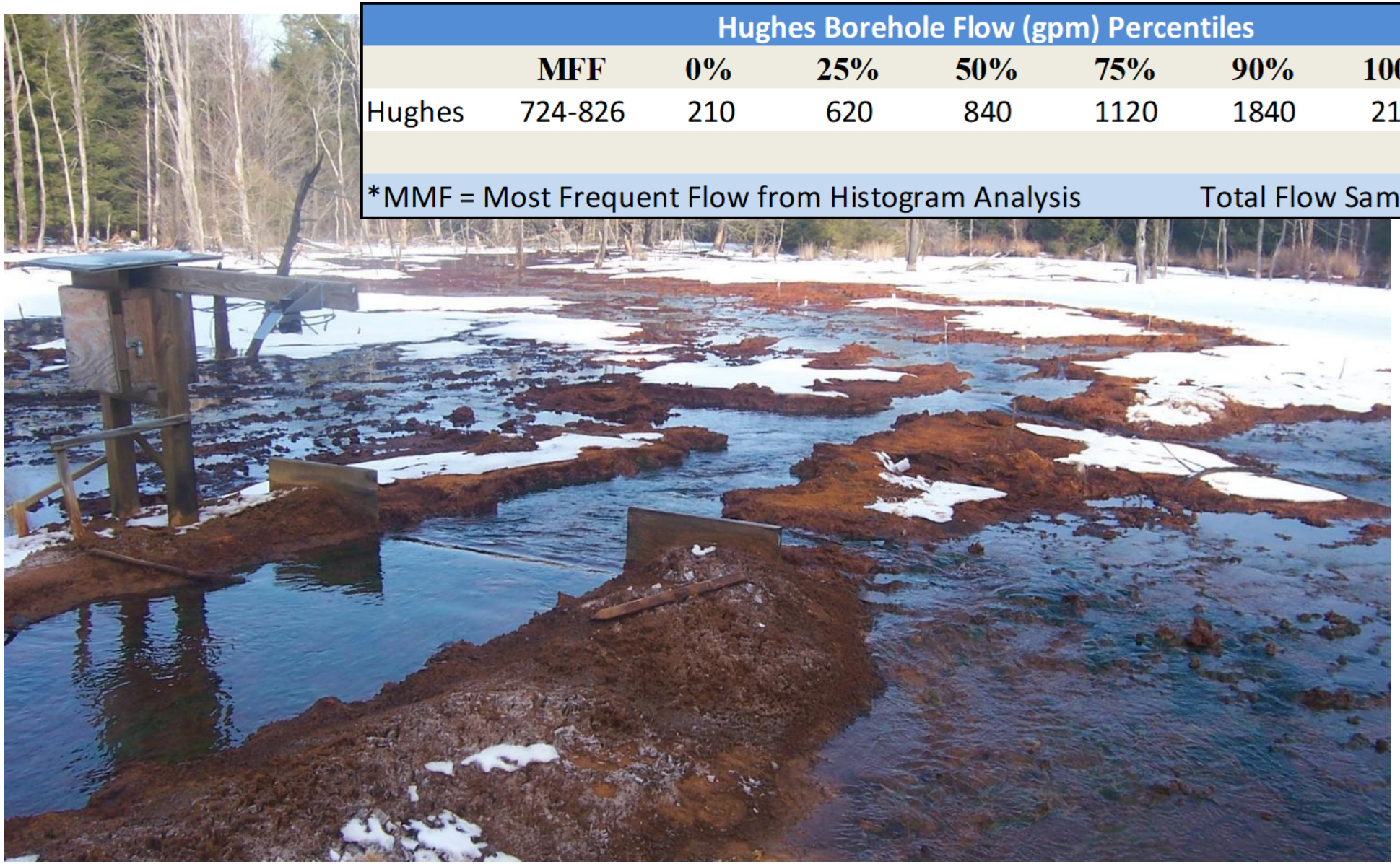

Photo Source: Penn State

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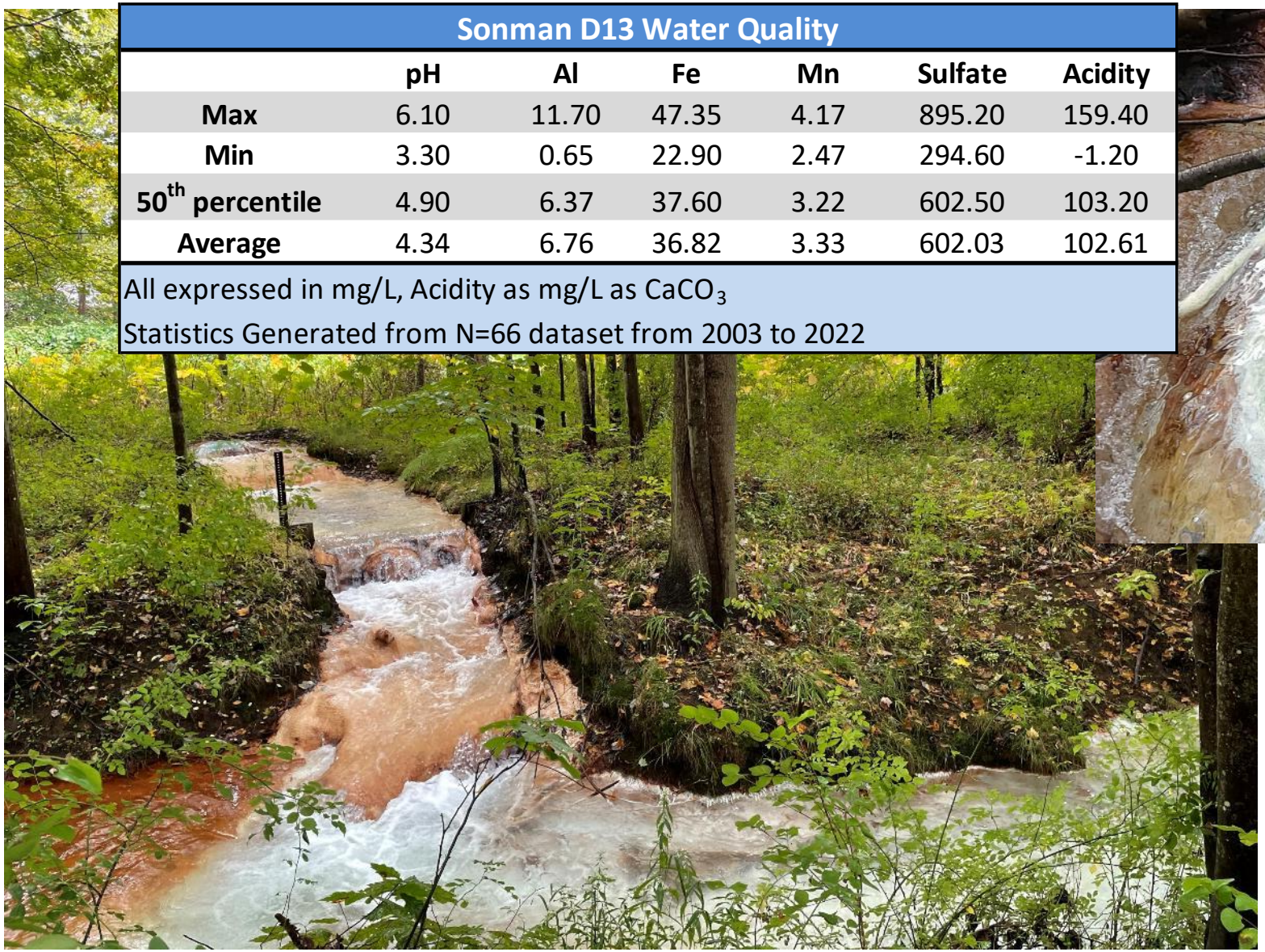
Sonman D13 AMD Borehole Discharge

Sonman D13 Water Quality						
	pH	**Al**	**Fe**	**Mn**	**Sulfate**	**Acidity**
Max	6.10	11.70	47.35	4.17	895.20	159.40
Min	3.30	0.65	22.90	2.47	294.60	-1.20
50th percentile	4.90	6.37	37.60	3.22	602.50	103.20
Average	4.34	6.76	36.82	3.33	602.03	102.61

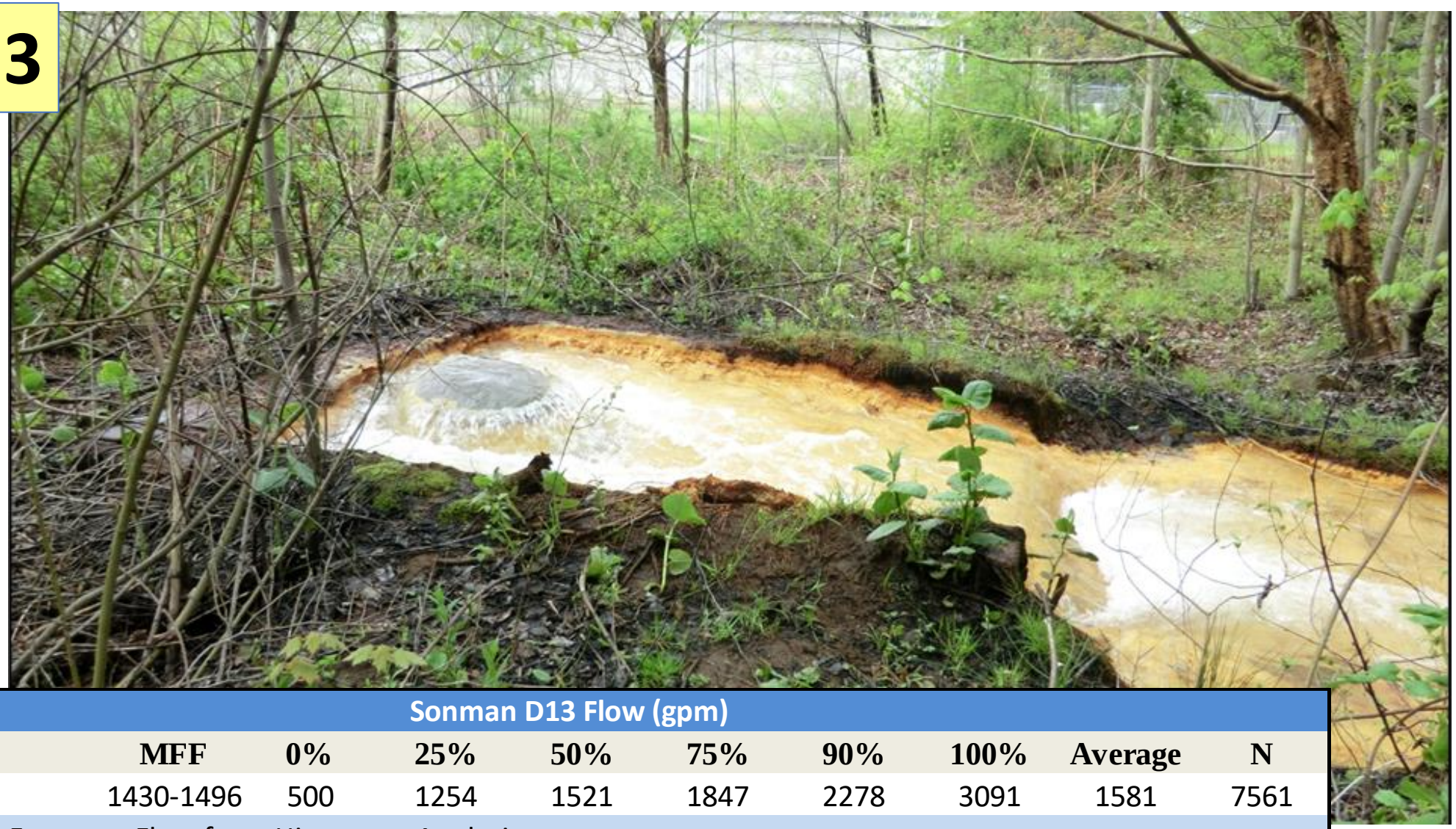
All expressed in mg/L, Acidity as mg/L as $CaCO_3$

Statistics Generated from N=66 dataset from 2003 to 2022



Sonman D13 AMD Borehole Discharge

D13



Sonman D13 Flow (gpm)									
	MFF	0%	25%	50%	75%	90%	100%	Average	N
Sonman D13	1430-1496	500	1254	1521	1847	2278	3091	1581	7561
*MMF = Most Frequent Flow from Histogram Analysis									

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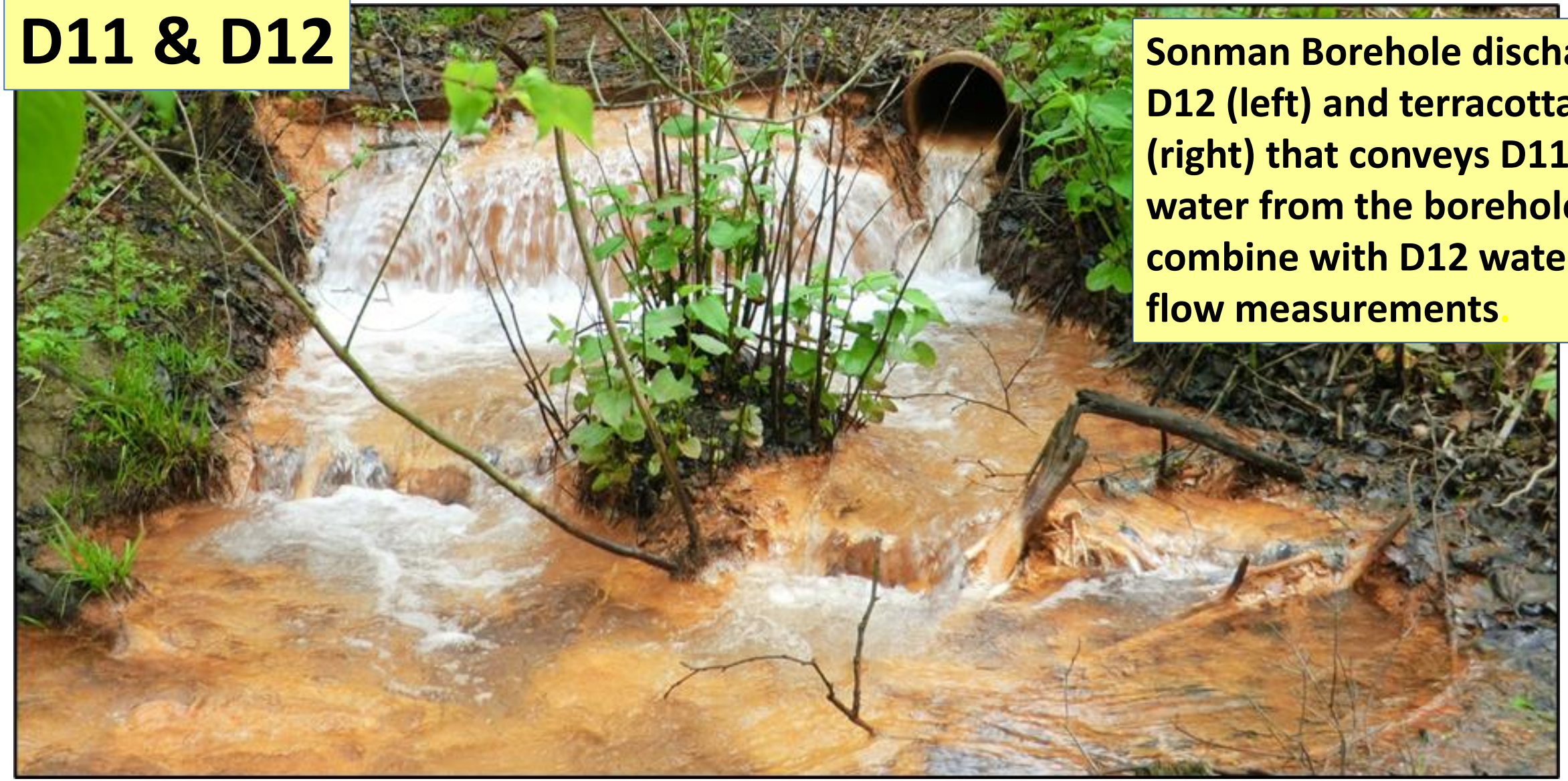
Sonman D11 and D12 Borehole Discharges

D11 & D12



Sonman Borehole discharge D12 (left) and terracotta pipe (right) that conveys D11 water from the borehole to combine with D12 water for flow measurements.

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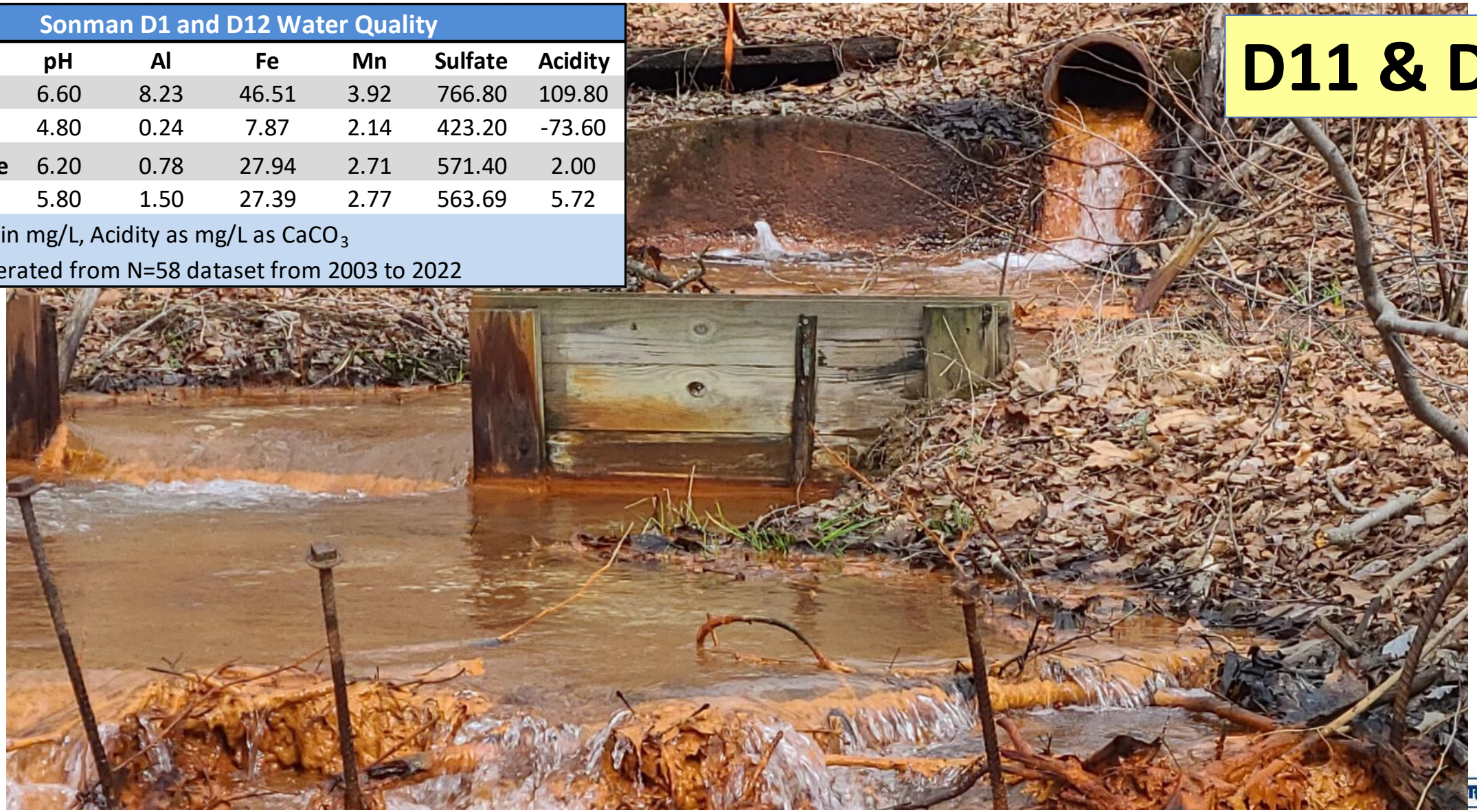
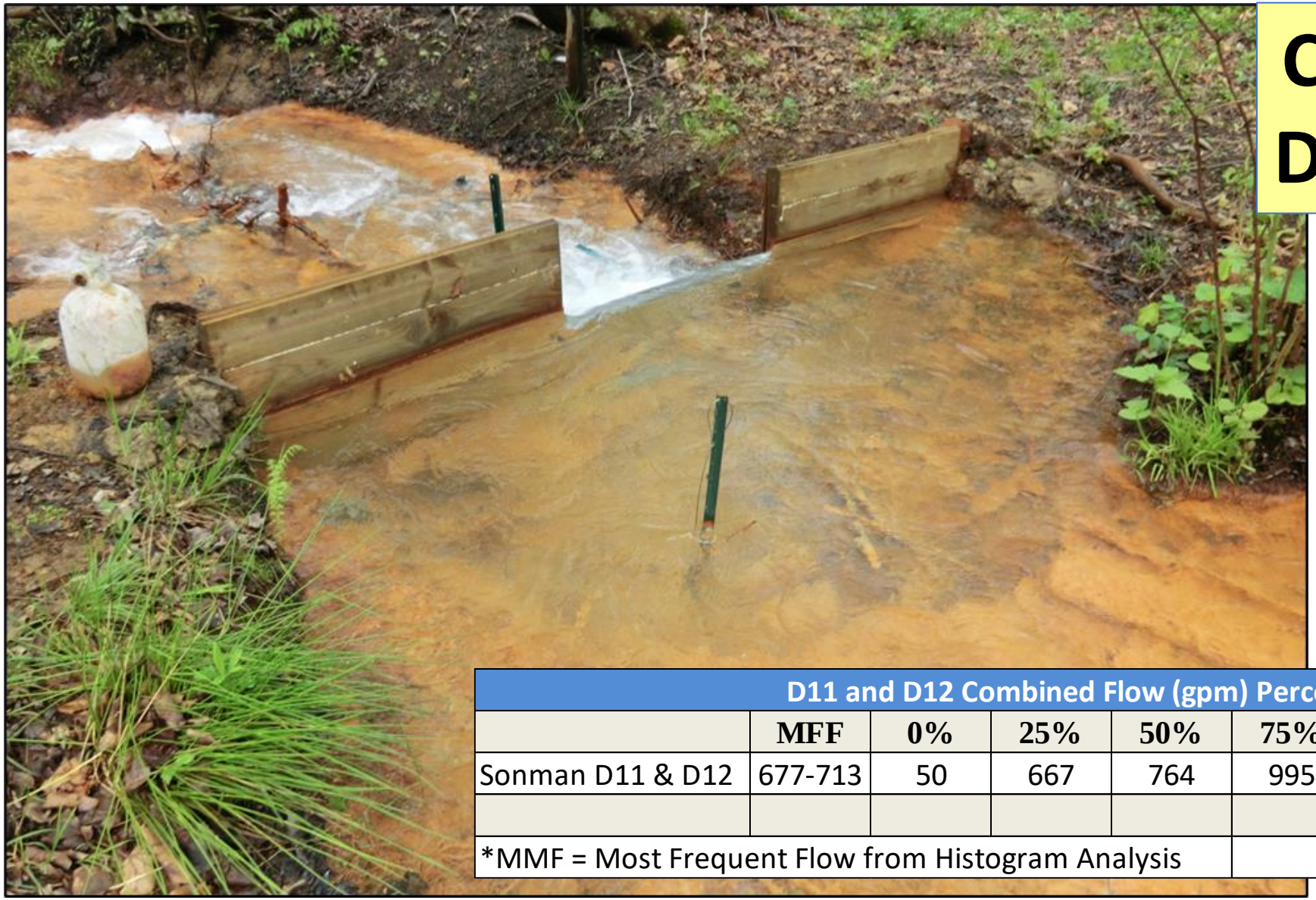
Sonman D11 and D12 Borehole Discharges

Sonman D1 and D12 Water Quality						
	pH	Al	Fe	Mn	Sulfate	Acidity
Max	6.60	8.23	46.51	3.92	766.80	109.80
Min	4.80	0.24	7.87	2.14	423.20	-73.60
50th percentile	6.20	0.78	27.94	2.71	571.40	2.00
Average	5.80	1.50	27.39	2.77	563.69	5.72
All expressed in mg/L, Acidity as mg/L as $CaCO_3$						
Statistics Generated from N=58 dataset from 2003 to 2022						



Sonman D11 and D12 AMD Borehole Discharges



Combined D11 & D12

D11 and D12 Combined Flow (gpm) Percentiles								
	MFF	0%	25%	50%	75%	90%	100%	Average
Sonman D11 & D12	677-713	50	667	764	995	1197	1486	820
*MMF = Most Frequent Flow from Histogram Analysis						Total Flow Samples = 7,809		

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Little Conemaugh River Restoration Goals

PA DEP and Stakeholders Little Conemaugh River Restoration Goals

Acknowledging the enormity and severity of the pollution problems within the Little Conemaugh (LC), as well as the need for further evaluation of impairments in addition to the seven major mine discharges, the goals for restoration are two-fold.

1. Restoration, where possible, of the main stem reaches of both the LC and the South Fork Little Conemaugh (SFLC) below the location of the seven major abandoned mine discharges to support fish and aquatic life, for boating, swimming, and fishing (Tier II); and
2. Restoration, where possible, of the main stem reaches of LC, the SFLC and of the various named and unnamed tributaries to meet the state-wide uses described above (Tier I).

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Technical Objectives of the LCMDTP Project

The LCMDTP Project contains five (5) primary technical objectives:

1. Design the LCMDTP with the capacity to treat the Hughes, Sonman, and Miller Shaft discharges,
2. Design a mine water conveyance system to allow for the artesian transfer of mine water from the Hughes mine to the Sonman Slope mine,
3. Design a redundant pumping system capable of dewatering the Sonman Slope mine to a minimum elevation of 1400 ft, controlling the Sonman Slope mine pool within an operational range of 1400 to 1477 ft, and conveying the mine water to the proposed LCMDTP,
4. Design a redundant sludge injection system to pump sludge into an underground mine for disposal. The Sonman Shaft No. 2 mine, present on the Project property, is a preferred injection option, and
5. Develop a design to recase and valve the Hughes Borehole, seal the Sonman D11 & 12 Boreholes, and design a safety grate for installation overtop of D13 that will prevent humans and debris from falling into the borehole but allow mine pool monitoring.

Little Conemaugh MDTP Design Criteria

The LCMDTP design and operation must meet the following hydraulic capacity and water quality criteria:

1. Range of combined operational pumping capacity for the mine water withdraw pumps:
    a. Minimum = 2,000 gpm (2.88 MGD)
    b. Maximum = 12,000 gpm (17.28 MGD)
2. MDTP maximum hydraulic capacity – 12,000 gpm (17.28 MGD)
3. Mine pool pumping system must control the mine pool between:
    a. Minimum = 1400 ft MSL
    b. Maximum = 1570 ft MSL

Little Conemaugh MDTP Design Criteria

4. Maximum hydraulic capacity of artesian mine pool conveyance system (transfer Hughes into Sonman) – 2,500 gpm (3.6 MGD)

5. MDTP Design Effluent Criteria:

Parameter	Maximum daily allowance
aluminum (total)	< 0.5 mg/l
iron (total)	<1 mg/l
suspended solids	<35 mg/l
pH	greater than 6.0; less than 9.0

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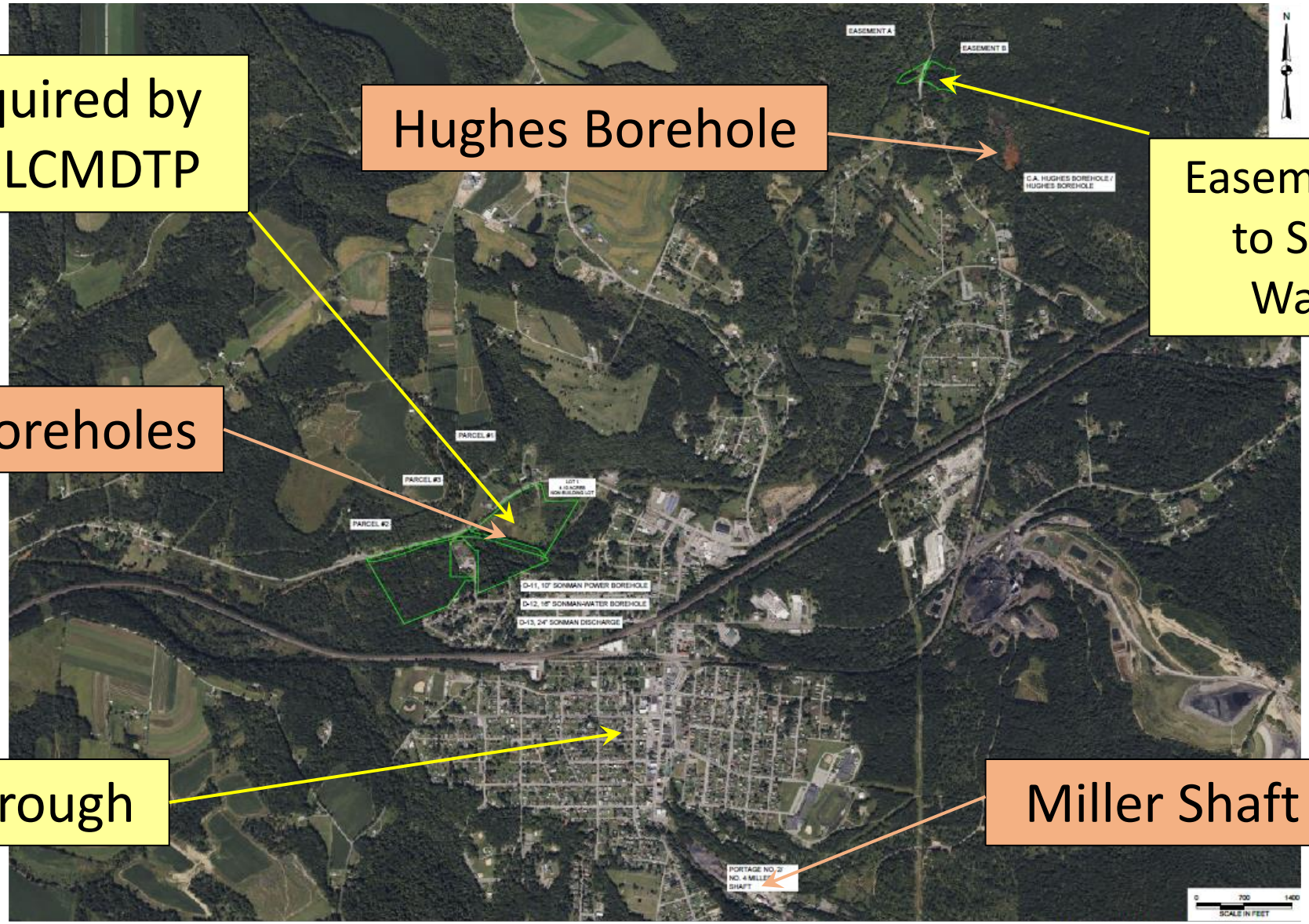
Project Location and Properties



Property acquired by FPW for the LCMDTP

Hughes Borehole

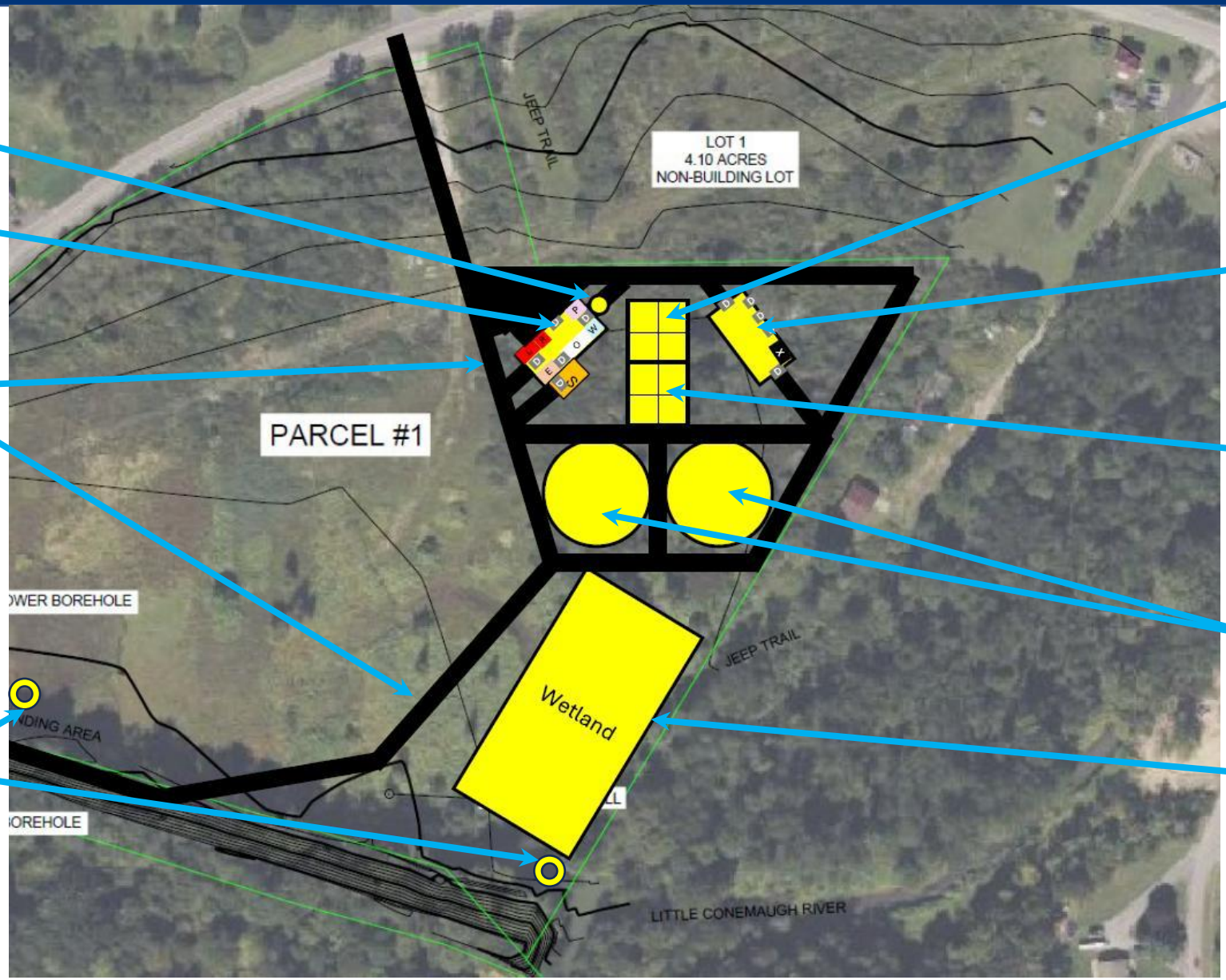
Easement for Hughes to Sonman Mine Water Transfer

Sonman Boreholes

Portage Borough

Miller Shaft Discharge

Preliminary Treatment Plant Layout



Lime Silo

Control/Operations Building

Access Roads

Extraction Wells w/ Vertical Turbine Pumps

Decarbonation Tanks

Maintenance Building

Mix Tanks Lime and Polymer Addition

Clarifiers

Polishing Wetland

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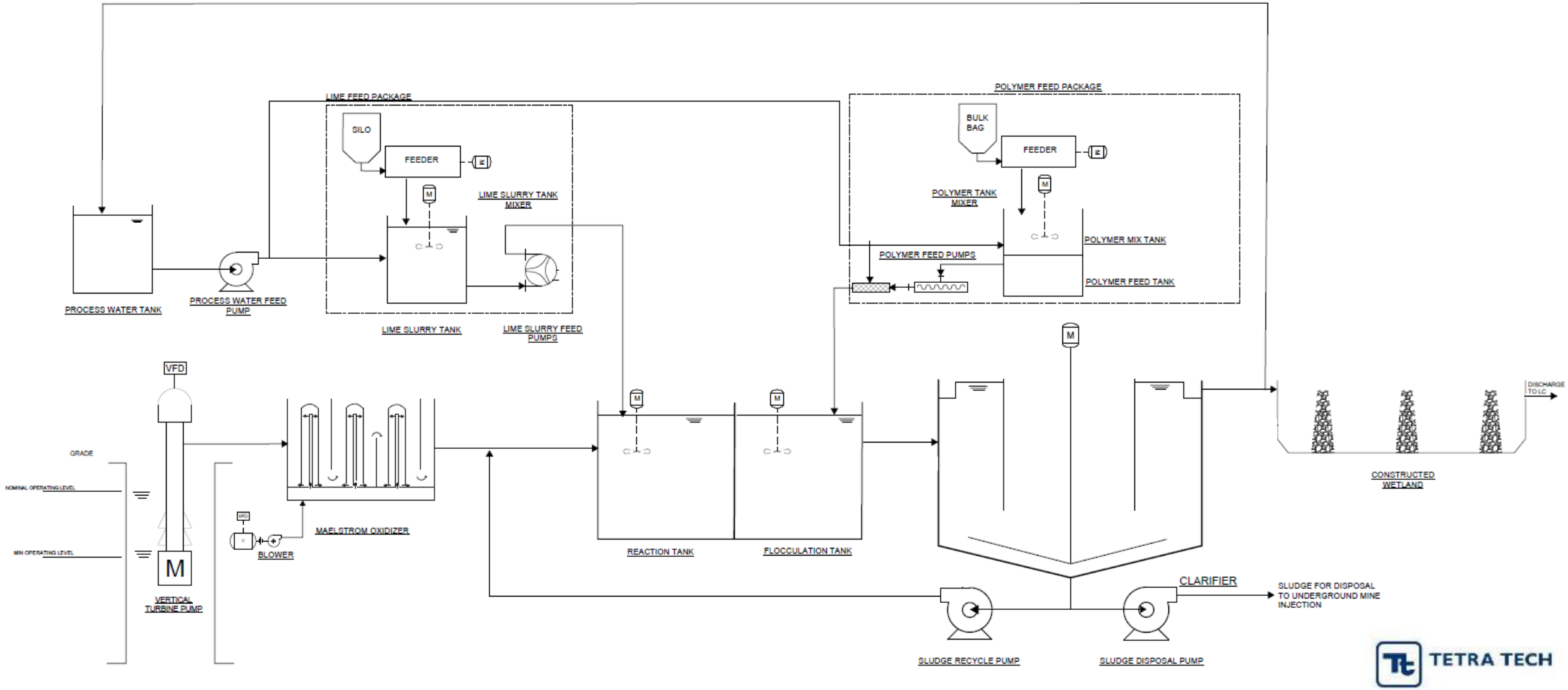
Preliminary Process Flow Diagram



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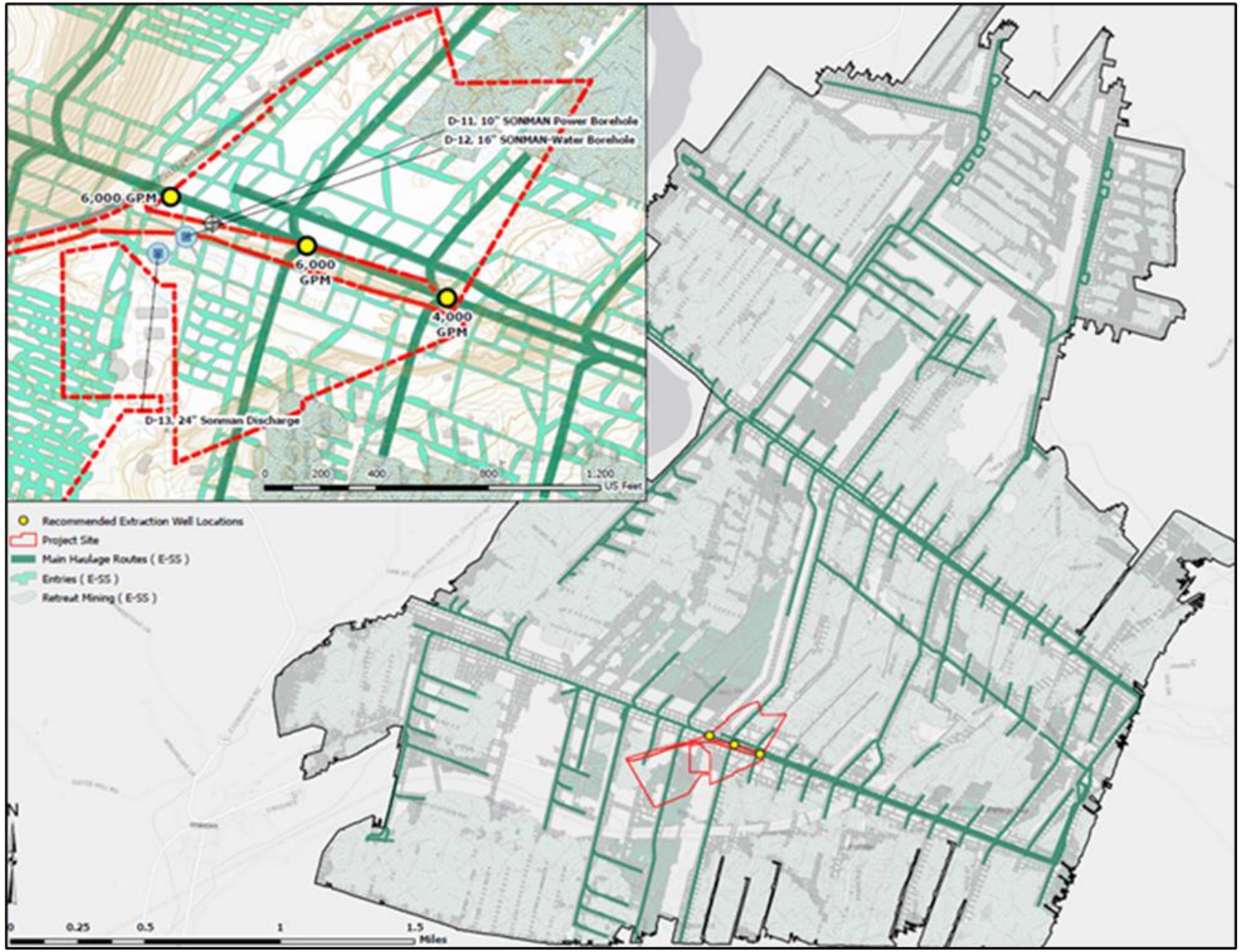
Proposed Extraction Well Locations



Project area, outlined in red along with the recommended installation locations for the three VTPs (noted as yellow circles on inset map) at or near intersections of coal haulage mains. Also shown for references are the three Sonman Boreholes denoted as blue circles.

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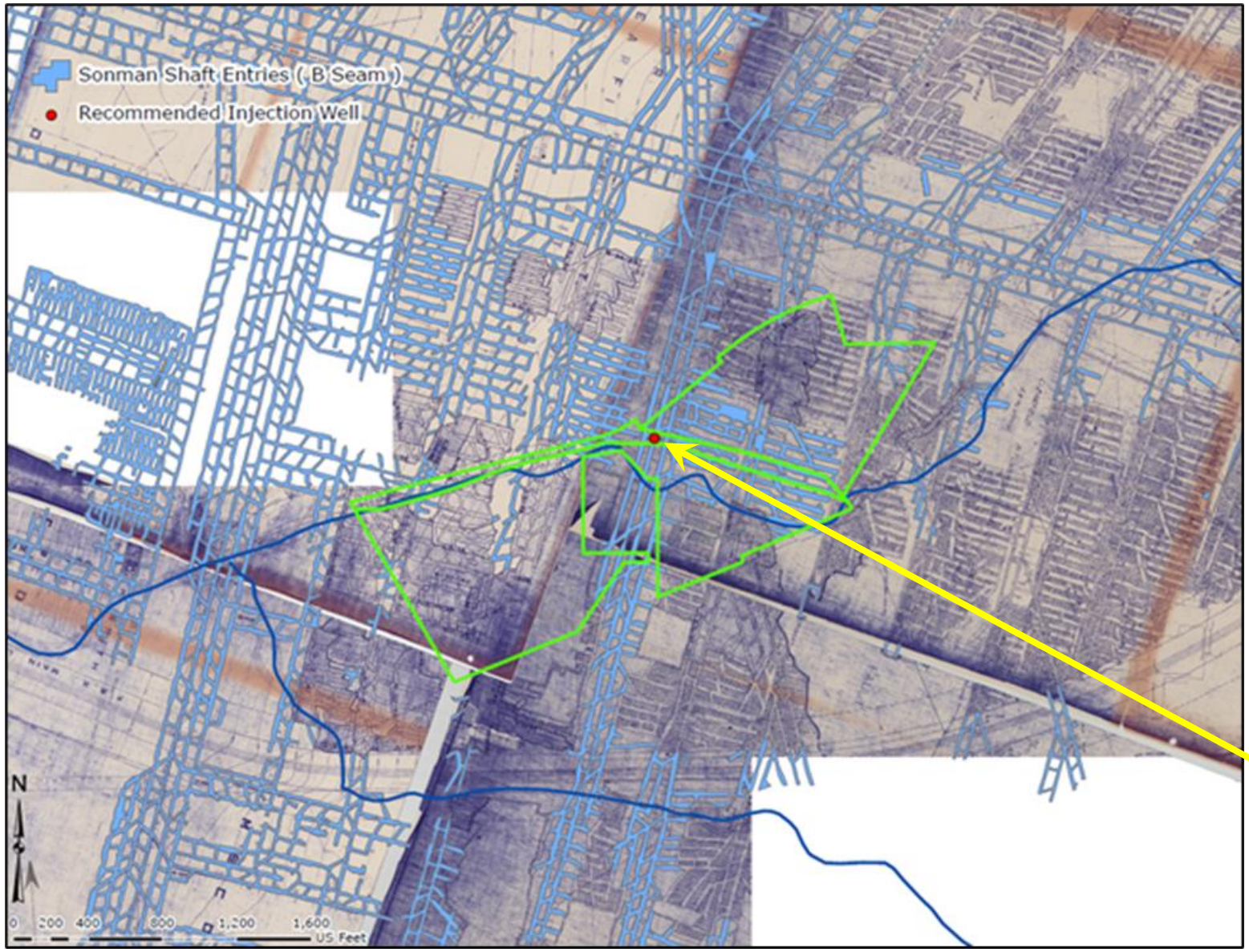
Proposed Sludge Injection Location



Preferred sludge injection into the “supported” areas (blue outline) of the Sonman Shaft mine within the green property boundaries. The non blue highlighted areas shown are areas of the Sonman Shaft mine that have been retreat mined with induced subsidence. Red circle is the preferred location.

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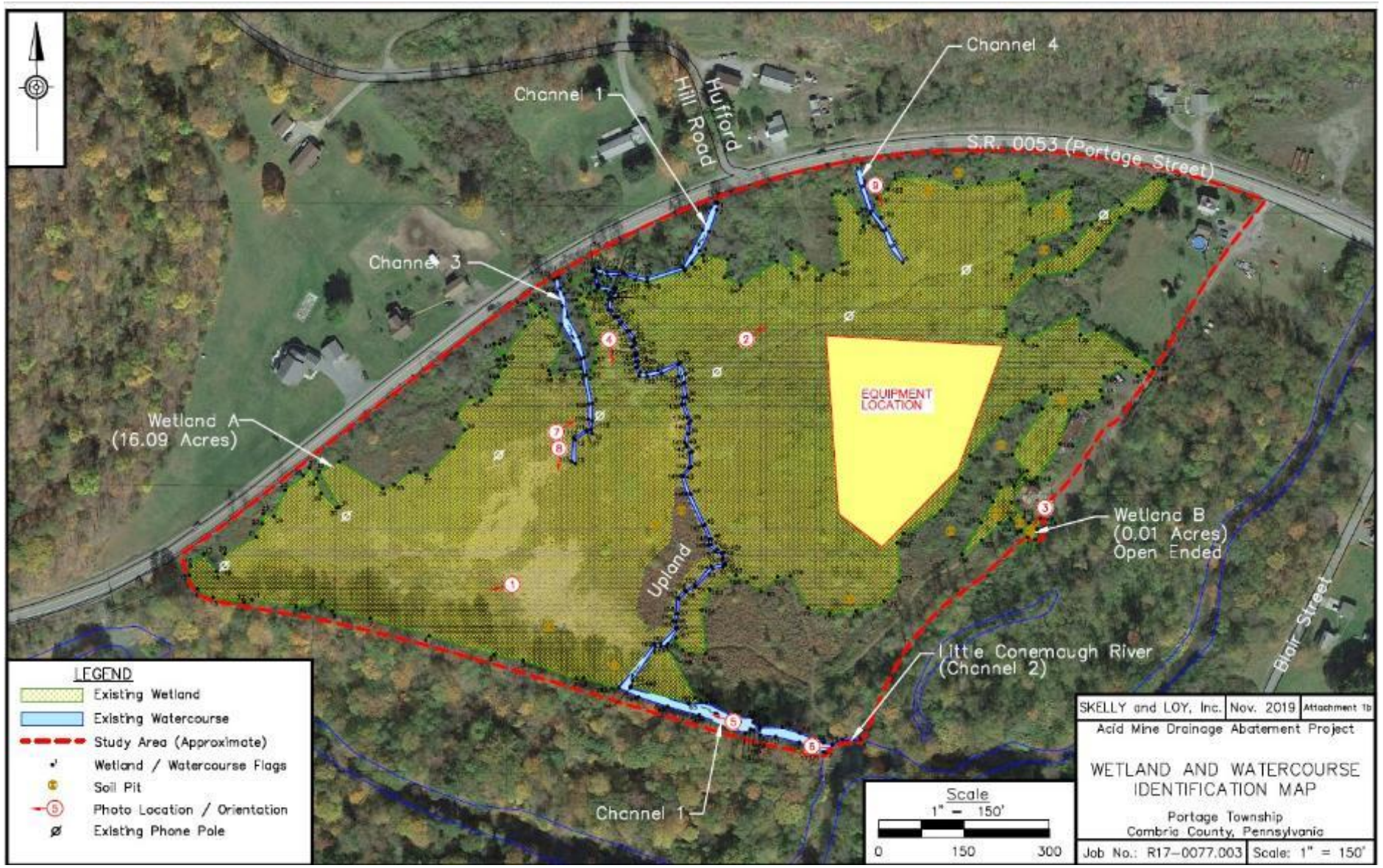
Project Challenges

Parcel Acquired for Planned Treatment Plant Location has 16+ acres of Jurisdictional Wetlands



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Project Challenges

Photo consideration provided by: Branden Diehl, Earth Wise Consulting & Foundation for Pennsylvania Watersheds (FPW)

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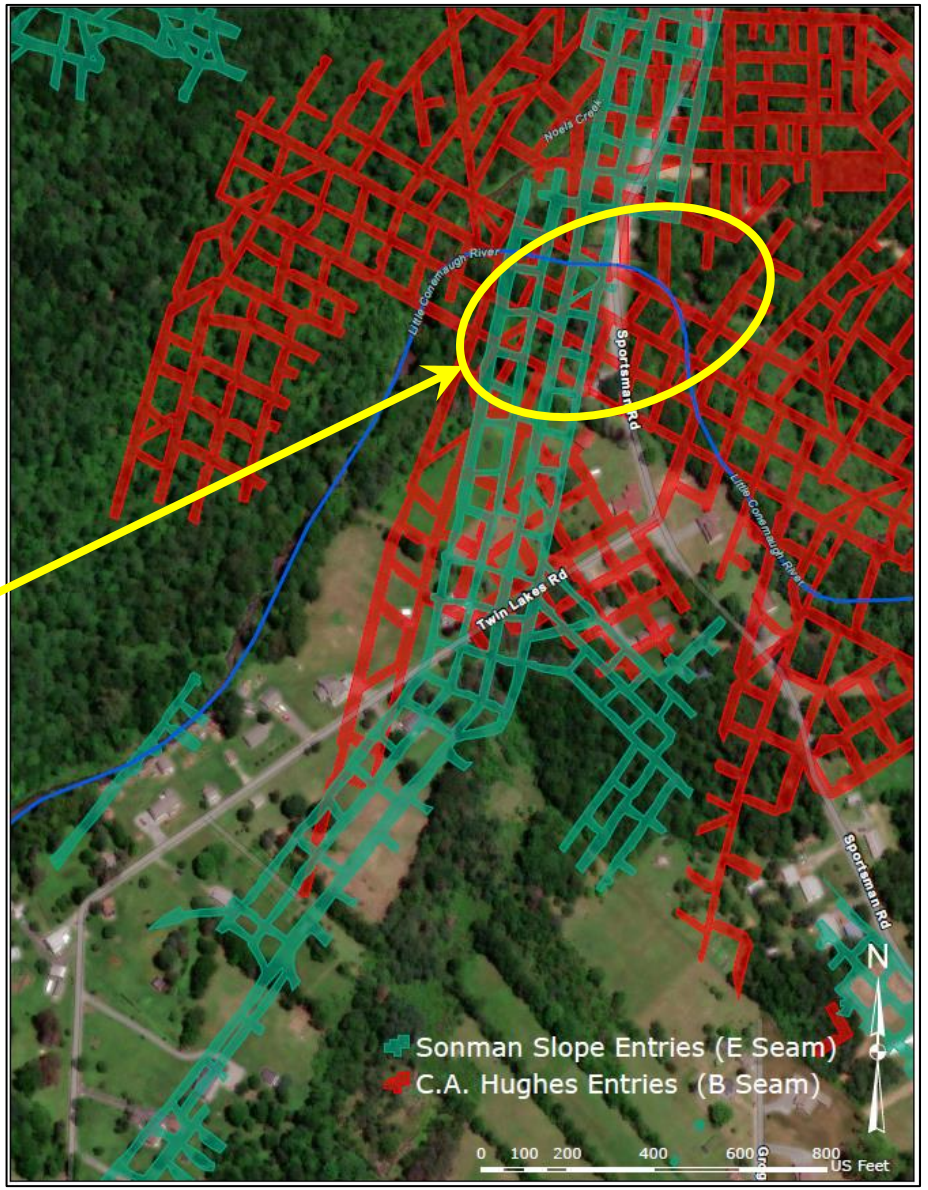
Project Challenges

Interconnection of Mines for Mine Water Transfer

Candidate Location to Construct a Water Conveyance System to Transfer Mine Water from the Hughes Mine to the Sonman Slope Mine in the Area where the Mines Overlap



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Project Challenges

Occasional Discharge of Coal Fines and Slurry Disposed of in the Sonman Mine

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Current Project Status

- Submitted the 5% Design Submittal to the Foundation for PA Watersheds on April 4, 2025
- Expecting feedback on or before April 23, 2025
- Initiating work on the 10% Design Milestone Tasks
  - Site Assessment including utilities, site access, preliminary site grading plan, updated wetland delineation and impact assessment, and geotechnical evaluation
  - Treatment Design Concept including finalizing the basis of design, initial sizing and layout of all treatment plant components, chemical consumption estimates, initial estimate of Probable Construction Cost
  - Mine Pool Control Evaluation including evaluation of pumping, sludge disposal, mine pool conveyance, and mine pool drawdown, storage, and operational elevations

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Current Project Schedule

Milestone	Allotted Time	Revised Date
Proposals Due	n/a	10/18/2024
FPW Project Team Review	2 weeks	11/1/2024
Interviews by FPW for Downselected Firms	1 week	11/8/2024
Award and Contract Execution	45 days (from RFP)	1/23/2025
Notice to Proceed (NTP)	15 days (from RFP)	1/27/2025
Kick Off Meeting	1 month	1/21/2025
Stop Work Due to AML Funding Freeze	33 days	01/30 - 03/03
5% Review of FPW Proposed Plan due	1 month	Due: 4/9/2025 Actual: 4/2/2025
Review and Approval by FPW Project Team	2 weeks	4/23/2025
10% Treatment Design Concept and Mine Pool Control Evaluation due	1 month	5/23/2025
Review and Approval by FPW Project Team	2 weeks	6/7/2025
35% Preliminary Design Package due	2 months	8/9/2025
Review and Approval by FPW Project Team	2 weeks	8/23/2025
65% Prefinal Design Package due	3 months	11/23/2025
Review and Approval by FPW Project Team	2 weeks	2/6/2025
95% Final Design Package due	2 months	2/7/2026
Review and Approval by FPW Project Team	4 weeks	3/4/2026
Incorporate FPW's Review Comments & Permit Requirements into the Final Drawings & Specifications & submit to FPW	3 months	**6/3/2026**

Red – Actual Date **Black – Targeted Date**

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Primary Project Partners

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Robindale

Foundation for Pennsylvania Watersheds

SCRIP

CAMBRIA COUNTY Conservation 1950 DISTRICT

WPCAMR

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

Rosebud Mining Company

CONEMAUGH VALLEY CONSERVANCY CVC

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Thank You!

Questions?

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