Tygart River Watershed - Acid Mine Drainage Remediation

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What is AMD (acid mine drainage)?

Acid mine drainage (AMD) occurs when sulfide (pyritic) minerals in rocks are exposed to oxidizing conditions

How do we treat AMD?

Treatment of AMD consists of:

In-Situ Treatment

Active Treatment

Passive Treatment

In-Situ Treatment

- Is used to treat AMD in the mine before it daylights.
- Consists of injecting alkaline material into mines.
- Alkaline material can consist of limestone, fly ash, sodium hydroxide, etc…
- Also used in areas where subsidence is common.

Active Treatment

Occurs on sites that have been permitted after 1977 and abandoned (WVDEP Special Rec)

Also, on active mine sites

Active treatment requires operations and maintenance funds (for chemical costs and sludge management)

Dosers

WVDEP – AML
Save The Tygart Watershed Association
WVWRI

Three Fork Creek Restoration Project

Construction Costs $750,491

Squires Creek doser

Table 2. Data from 13 pre-construction samples and 8 post construction samples

Site Description/Location	Median pH	Average Hot Acidity (mg/l as CaCO3)	Average Alkalinity (mg/l as CaCO3)
South Fork Birds Creek near mouth	3.8	95.56	0.82
South Fork Birds Creek near mouth	7.32	12.69	31.02
North Fork Birds Creek at mouth	3.9	55.05	0.90
North Fork Birds Creek at mouth	4.93	15.69	18.20
Birds Creek at mouth	3.9	85.07	0.80
Birds Creek at mouth	6.67	10.54	18.80
Squires Creek at mouth	3.35	101.58	0.82
Squires Creek at mouth	6.45	16.94	25.74
Raccoon Creek upstream of Little Raccoon Creek	3.3	134.37	0.82
Raccoon Creek upstream of Little Raccoon Creek	4.74	34.69	12.23
Raccoon Creek at mouth	4.1	96.15	1.71
Raccoon Creek at mouth	6	9.77	7.78
Three Fork Creek downstream of Birds Creek	4.4	52.86	1.07
Three Fork Creek downstream of Birds Creek	7.03	6.79*	15.83
Three Fork Creek downstream of Raccoon Creek	4.8	30.69	3.07
Three Fork Creek downstream of Raccoon Creek	6.9	7.62*	15.88
Three Fork Creek at Thornton	4.9	28.87	3.68
Three Fork Creek at Thornton	7.1	3.69*	17.75
Three Fork Creek near mouth	5.1	21.87	2.30
Three Fork Creek near mouth	7.08	5.36*	19.59

Raccoon Creek prior to dosing

Raccoon Creek after dosing

Large Scale Centralized Systems

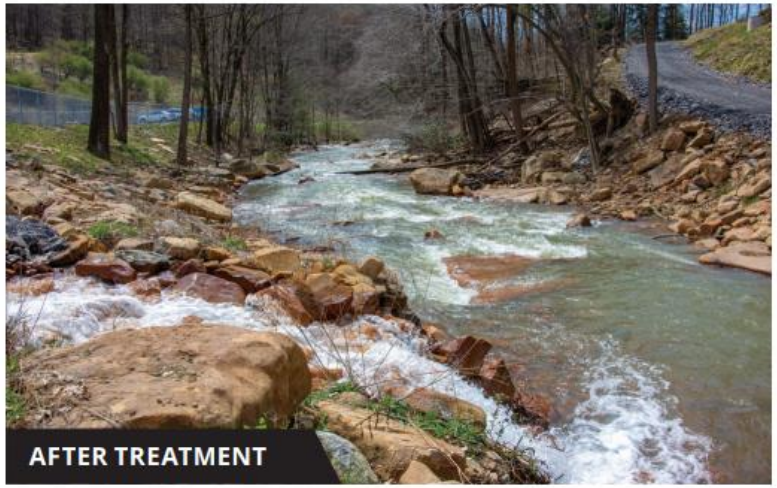
Few currently online in WV

However, BIL funding will aid in the support for these systems

Southwestern Energy
WVDEP
Friends of Cheat
WVWRI

Muddy Creek Watershed Restoration Project

First watershed-based National Pollutant Discharge Elimination System (NPDES) permit ever issued in the country.



Passive Treatment

Passive Treatment

Is a one-time system designed to treat a discharge for a certain number of years (usually 20)

Theoretically does not require any additional operations and maintenance after installation

Uses alkaline material to raise pH, and precipitate metals

Examples of Technologies Used for Passive Treatment

- Open Limestone Channels
- Iron Oxidation Terrace
- Anoxic Limestone Drains
- Wetlands
- Successive Alkalinity Producing Systems (SAPS)
- Limestone Leach Beds
- Steel Slag Leach Beds

AMD Treatment Projects in the Tygart Watershed

Project Partners and Funding:

STTWA
NMLRC
WVDEP-WIB
WVDEP-DLR
OSMRE
Penn Virginia

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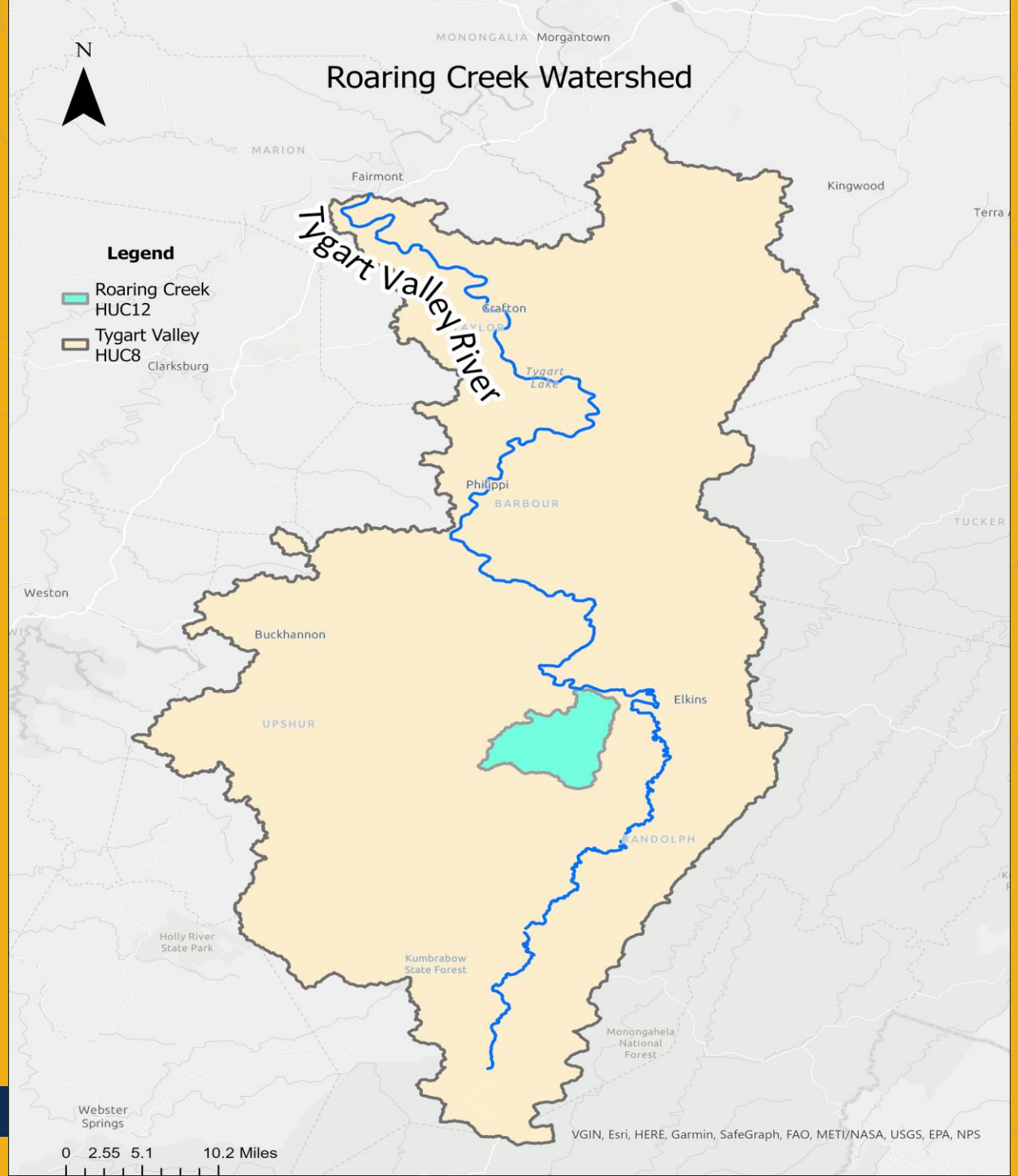

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Current Projects:

Roaring Creek Projects (Kittle Hollow)
WV 387: Mars Portals - North Portals Phase II: $327,982
WV 403: Mars Portals Phase I: $500,000

Recently Completed Projects:

WV 363: Barlow Portals Passive Treatment Site Preparation: $212,716 – WVDEP-DLR
Active Treatment – Construction to begin in Spring, 2024
WV 364: Mars Portals (North Portal) Passive Treatment – Phase I: $452,639

WV-364 Mars Portals – North Portals Phase I

WVDEP-funded 319 projects require a 40% match; match funds are secured through OSMRE, Stream Restoration, and Foundation funds.

The slide photo is of the North Portal at the Mars Portals site before the AMD treatment project was installed

WV-364 North Portals Phase I

- Completed in September of 2022
- Limestone additions completed in September 2023
- Treatment consists of limestone beds, settling ponds, and an aeration wheel
- The goal of phase I is to raise the pH and settle out the precipitated metals in the limestone beds and settling ponds


Untitled Map
Mars Portals and North Portals Project Area
Back Entrance
North Portals Project Area
Mars Portals
Mars Portals Entrance Gate
The Chicken Coop
Coalton VFW
Coalton
Kittle Hollow Mouth
Country pups grooming
Coalton VFD
Transportation Department Highways
Legend
2000 ft
Google Earth
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WV-364 North Portals Phase I

WV-364 North Portals Phase I

System performance:

- **Pre-construction pH average: 3.4**
- **Post-construction pH average for the system out: 6.8**
- **Raw water total iron: 10 mg/L**
- **Treated water total iron: <2 mg/L**
- **Raw water total aluminum: 3 mg/L**
- **Treated water total aluminum: <1 mg/L**

Schedule Moving Forward

Future Projects in the Roaring Creek Watershed:

1. **WV-386 North Portals Phase II – Expected Construction – Fall, 2024**
2. **WV-403 Mars Portals Phase I – Expected Construction – Fall, 2025**
3. **WV-407 Mars Portals Phase II – Expected Construction – Fall, 2026**

WV-363 Barlow Portals Project

- **The Barlow Portals are a significant source of AMD that are direct drain to the Left Fork of the Little Sandy Creek**

- **This project consisted of road construction and was completed in October of 2022**

- **WVDEP-DLR is beginning a central treatment plant on LFLS in Spring of 2024**

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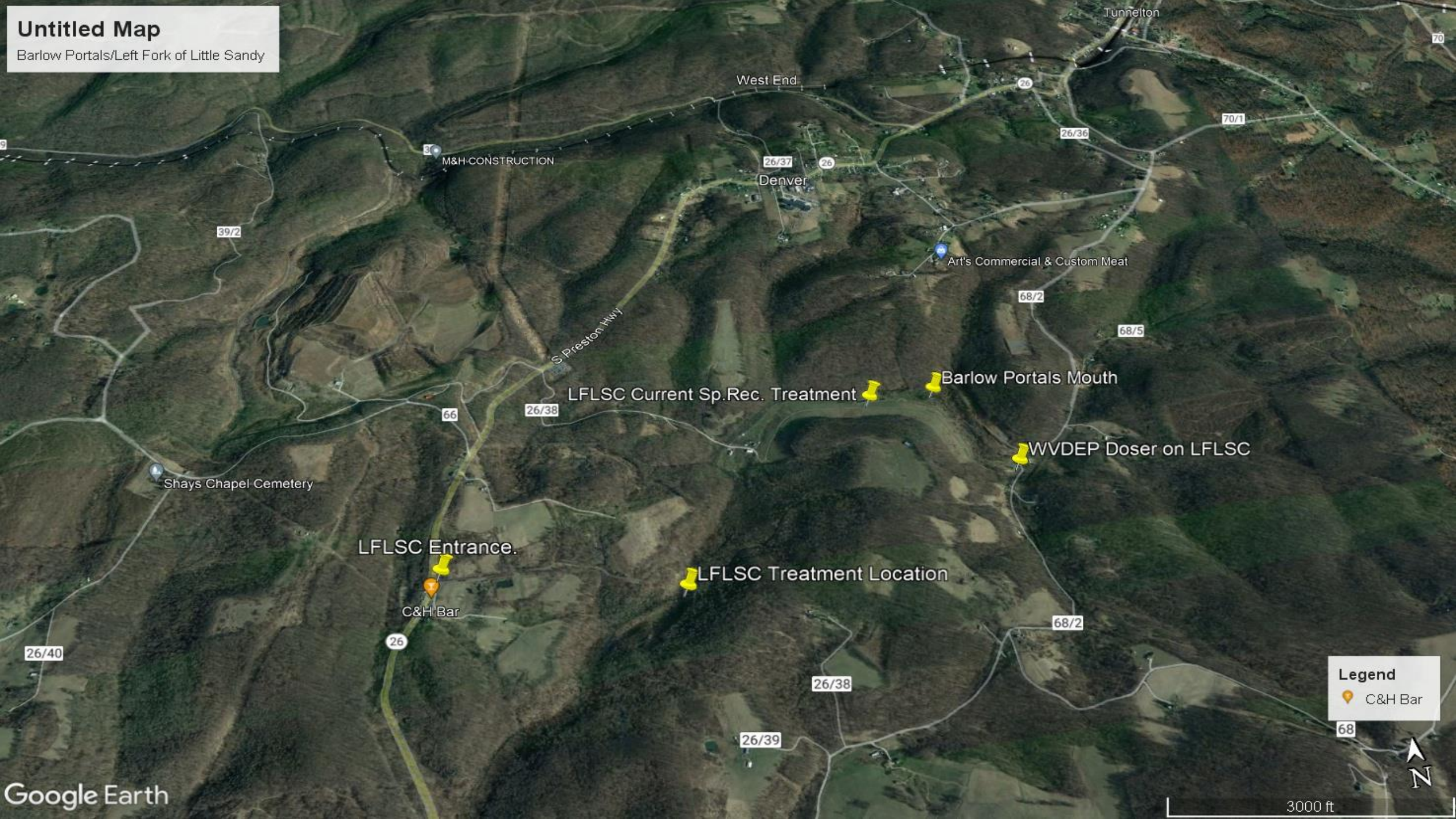
Untitled Map
Barlow Portals/Left Fork of Little Sandy
Tunnelton
West End
M&H CONSTRUCTION
Denver
Art's Commercial & Custom Meat
S Preston Hwy
LFLSC Current Sp.Rec. Treatment
Barlow Portals Mouth
WVDEP Doser on LFLSC
Shays Chapel Cemetery
LFLSC Entrance.
LFLSC Treatment Location
C&H Bar
26
26/36
70/1
70
26/37
39/2
68/2
68/5
66
26/38
26/40
26/39
68
Legend
C&H Bar
N
3000 ft
Google Earth

Future Site of the treatment system that will treat up to 2,500 gpm of AMD-polluted waters

Special thanks to Martin Christ (WVDEP-WIB) and Kelley Flaherty (STTWA) for making these projects possible!

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