Tomhicken Creek Restoration Projects

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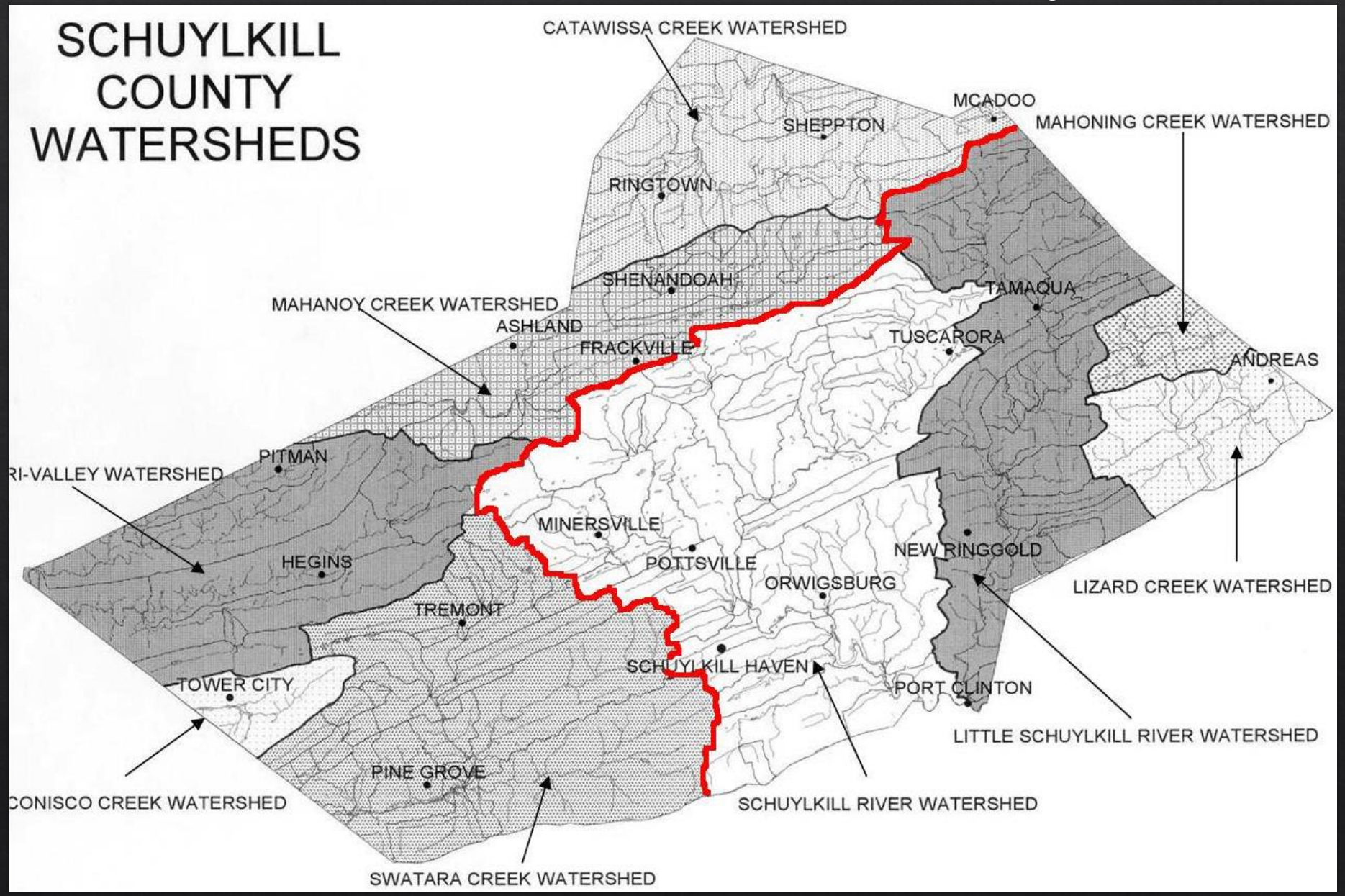

Tomhicken Creek Restoration Projects

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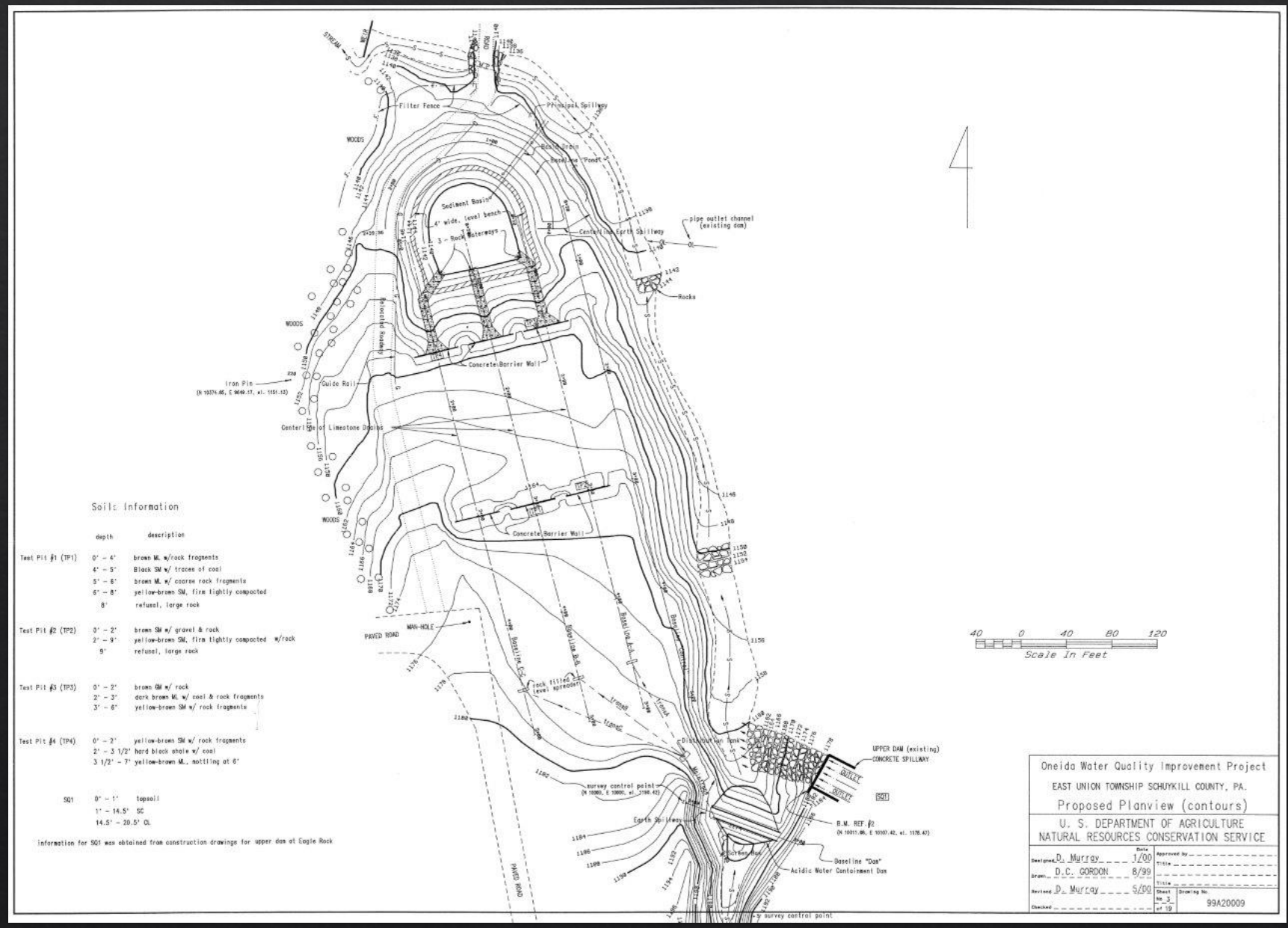
Oneida #1 Mine Tunnel Water Quality

- Design Water Quality
- Flow – 560gpm – 3,000gpm
- pH – 3.6 – 4.2
- Alkalinity – 0 – 3.4 mg/L $CaCO_3$
- Acidity – 40 – 2 mg/L $CaCO_3$
- Total aluminum – 1.4 – 4.9 mg/L
- Total iron – negligible

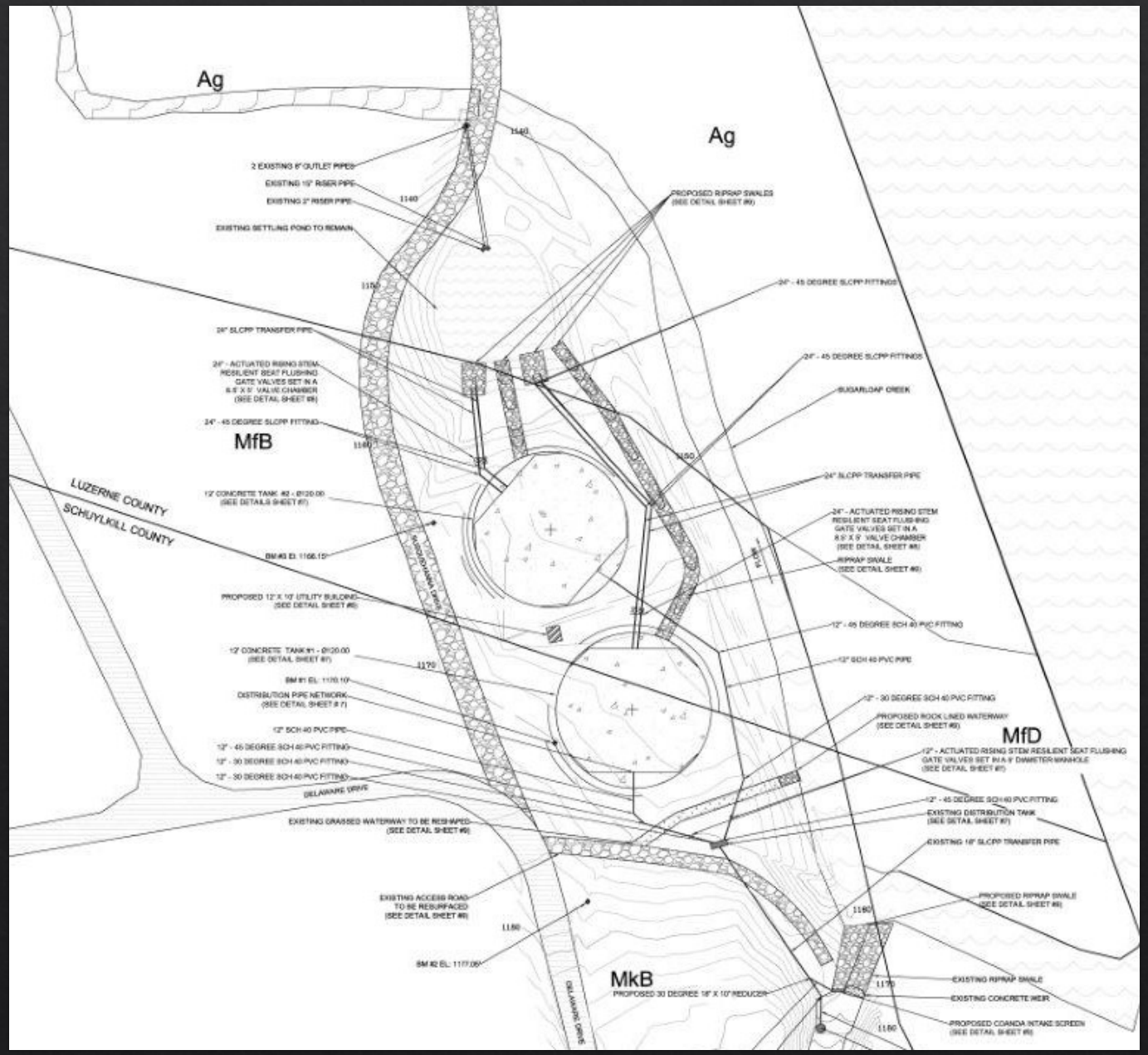
Oneida #1 Treatment System

Oneida #1 Treatment System

Oneida #1 Treatment System Design



Oneida #1 Treatment System Redesign



Oneida #1 Treatment System Water Quality

Oneida #1

- Flow – 1,042 gpm
- pH – 4.4
- Net acidity – 21.2 mg/L CaCO3
- Total aluminum – 1.720 mg/L
- Total iron – < 0.3 mg/L

Treatment System Outlet

- Flow – 622 gpm
- pH – 6.7
- Net acidity – -6.9 mg/L CaCO3
- Total aluminum – 0.598 mg/L
- Total iron – < 0.3 mg/L

Oneida #1 Treatment System Water Quality

Lake Susquehanna Outlet

- Flow – not sampled
- pH – 6.1
- Net acidity – 1.5 mg/L CaCO3
- Total aluminum – < .5 mg/L
- Total iron – < 0.3 mg/L

Lake Choctaw Outlet

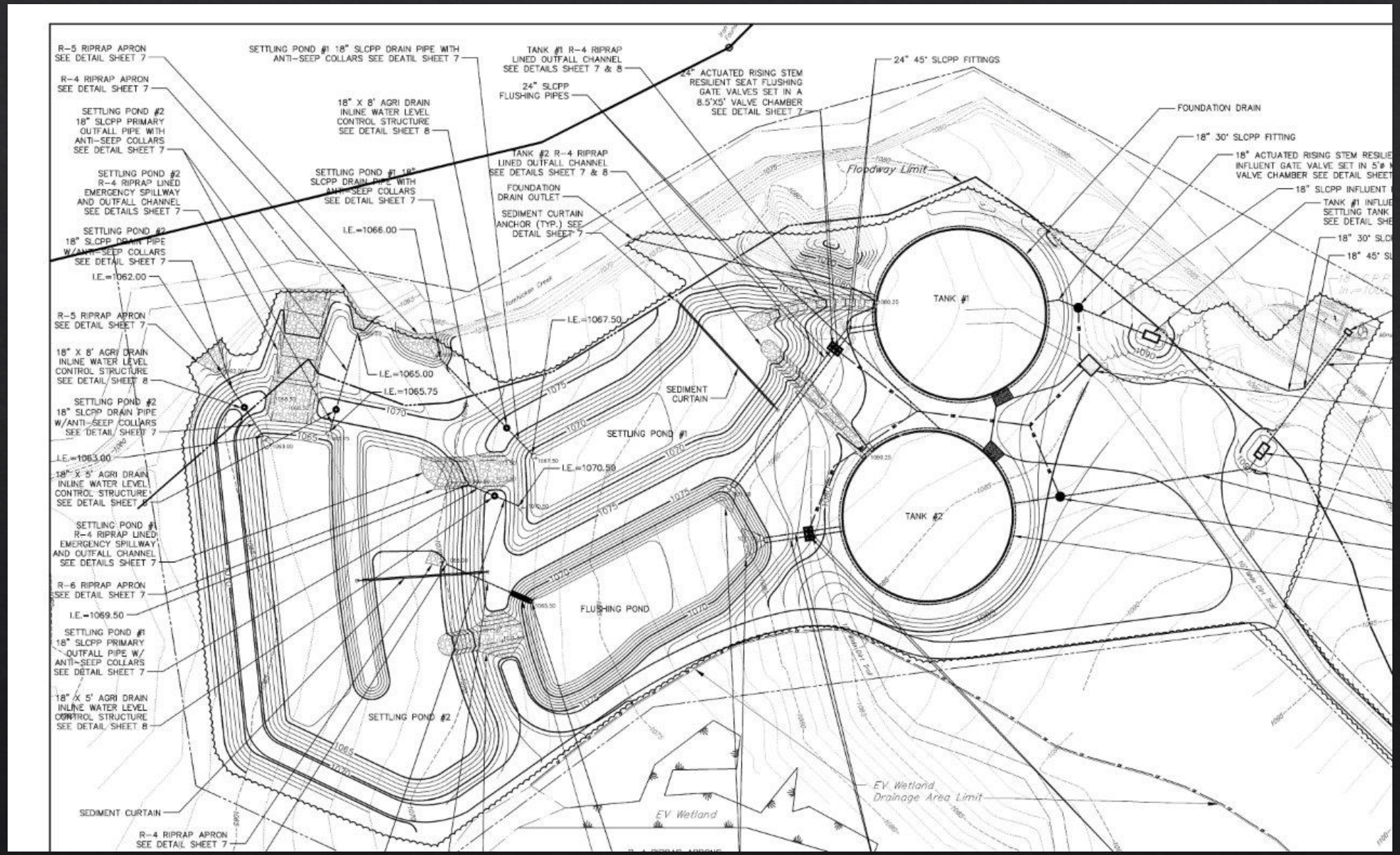
- Flow – not sampled
- pH – 6.4
- Net acidity – 2.8 mg/L CaCO3
- Total aluminum – < 0.5 mg/L
- Total iron – < 0.3 mg/L

Oneida #3 Mine Tunnel Water Quality

- Design Water Quality
- Flow – 4,000 gpm
- pH – 4.6 units
- Net acidity – 15 mg/L $CaCO_3$
- Total aluminum – 2.0 mg/L
- Total iron – <0.2 mg/L

Oneida #3 Treatment system

Oneida #3 Treatment System Design



Oneida #3 Treatment System Water Quality

Oneida #3

- Flow – 2,504 gpm
- pH – 5.4
- Net acidity – 11.5 mg/L CaCO3
- Total aluminum – < .927 mg/L
- Total iron – < 0.3 mg/L

Treatment System Outlet

- Flow – 2,313 gpm
- pH – 6.4
- Net acidity – -3.2 mg/L CaCO3
- Total aluminum – < 0.714 mg/L
- Total iron – < 0.3 mg/L

Oneida #3 Treatment System Water Quality

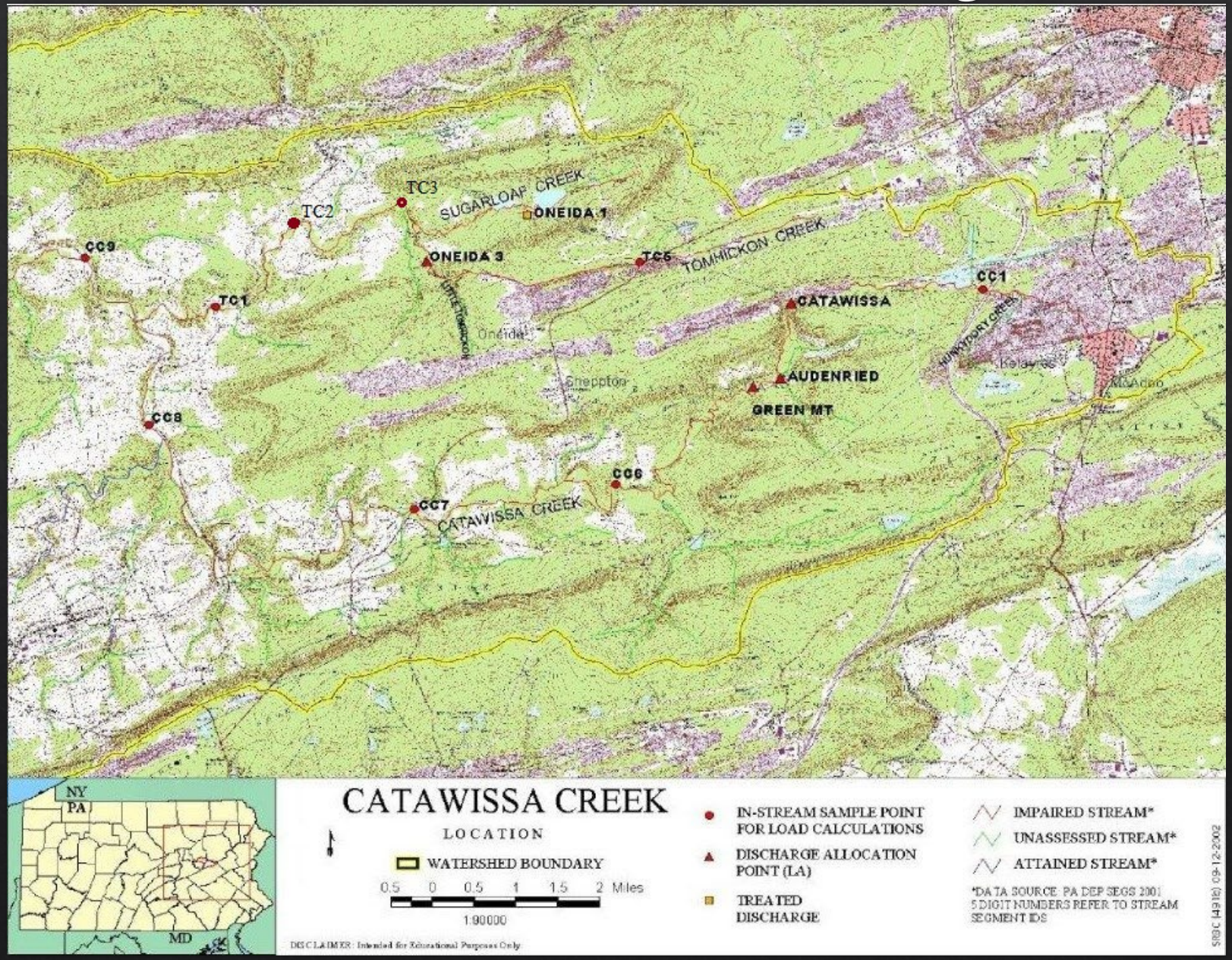
Upstream of Treatment System

- Flow – not sampled
- pH – 7.3 units
- Net acidity – -42.5 mg/L CaCO3
- Total aluminum – < 0.5 mg/L
- Total iron – < 0.3 mg/L

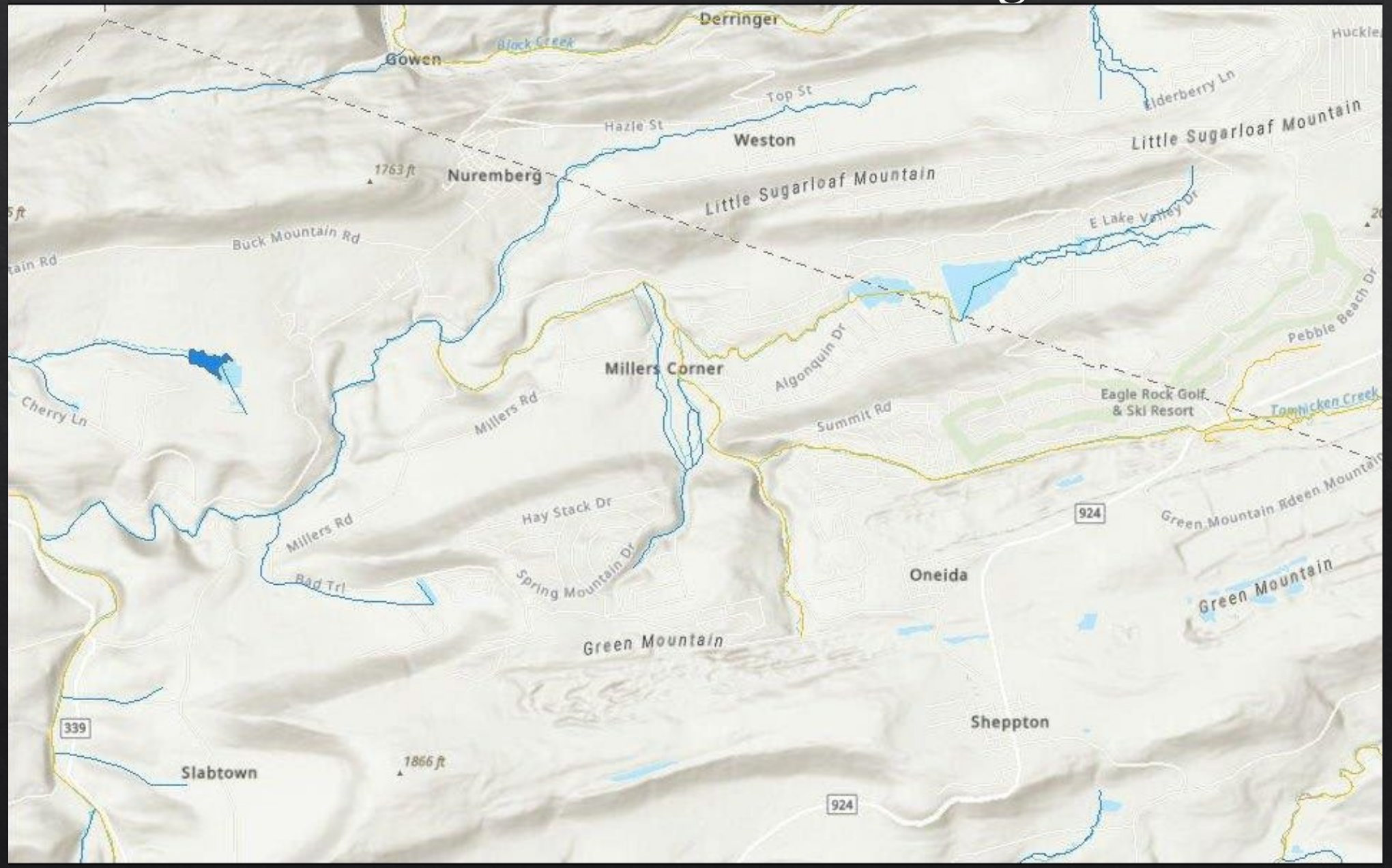
Downstream of Treatment System

- Flow – not sampled
- pH – 6.9
- Net acidity – -17.8 mg/L CaCO3
- Total aluminum – < 0.5 mg/L
- Total iron – < 0.3 mg/L

Tomhicken Creek Delisting



Tomhicken Creek Delisting



Tomhicken Creek Delisting

Monitoring Point: TC1

	Sample Date																		
Unit - Test	12/16/10	01/15/13	10/15/13	05/12/14	09/16/14	12/01/14	04/08/15	08/04/15	04/21/16	07/06/16	09/08/16	12/14/16	04/20/17	08/01/17	11/02/17	04/11/18	08/29/18	Averages	Max	Min
Gal/Min																				
Stream Flow	21,322	15,598	2,377	13,868	3,534	7,776	22,716	4,074	10,544	6,814	3,043	6,430	15,116	10,823	5,170	19,767	13,265	10,720	22,716	2,377
mg/L																				
CALCIUM, TOTAL	7.425	6.976	9.94	7.223	9.96	8.074	8.377	10.67	6.485	8.255	10.8	11.5	6.711	7.665	9.87	7.664	8.57	8.60	11.50	6.49
HARDNESS, TOTAL	36	32	61	37	54	44	39	57	32	47	58	57	33	40	51	37	40	44.41	61.00	32.00
MAGNESIUM, TOTAL	4.337	3.466	8.83	4.558	7	5.662	4.335	7.305	3.882	6.477	7.466	6.805	3.928	4.997	6.417	4.282	4.45	5.54	8.83	3.47
Total Acidity as CaCO3	3.6	-7.6	-20.8	12.2	-18.8	-8.4	2	11.2	-9.8	-18.4	-9.6	-8.4	-6.2	-7.2	-14.8	-1.2	-10	-6.60	12.20	-20.80
Total Sulfate	18.1	16.96	28.45	18.23	27.2	20.3	16.9	25.98	16.63	38.3	27.5	25.4	18.94	19	22.29	17.47	19.52	22.19	38.30	16.63
TOTAL SUSPENDED SOLIDS	5	5	5	5	5	5	12	5	5	5	5	5	5	5	5	5	5	5.41	12.00	5.00
pH units																				
PH - FIELD	6.61	6.55	7.13	6.56	6.44	6.34	6.62	7.3			7.53	6.71	6.51	6.58	6.11	6.44	6.09	6.63	7.53	6.09
pH, Lab	6.8	7.1	7.1	7.1	7.4	7.4	6.9	7.6	7.3	7.2	7.4	7	6.9	7.2	7.2	7.1	7	7.16	7.60	6.80
ug/L																				
ALUMINUM, TOTAL	315	164	92.5	197	73.6	239	359	96.3	141.445	235	232	78.15	293	241	105	286	284	201.88	359.00	73.60
IRON, TOTAL	93	101	91	93	83	117	144	108	66	148	129	70	107	151	92	98	142	107.82	151.00	66.00
MANGANESE, TOTAL	180	99	18	148	20	107	168	34	91	78	26	90	145	124	31	151	107	95.12	180.00	18.00
ZINC, TOTAL	39.9	29.5	14.6	27.7	10.3	37.6	42	12.6	25.127	29.4	103	29.16	43.1	32.3	16.1	40.6	23.8	32.75	103.00	10.30
umhos/cm																				
Specific Conductance - Field		190	340	220	321	280	252	307			279	309	225	221.9	292	270	229	266.85	340.00	190.00

Tomhicken Creek Delisting

Table 1. PADEP IBI scores and water quality for the Tomhicken Creek Stations.

Sampling Stations	Date Sampled	DEP IBI	Qualifiers check out?	Impaired?	Temp	Field Cond	DO	Field pH	Turbidity	Flow	Lab Contractor	Hot Acidity	T Alk	Lab pH	Lab Cond	SO4	TSS	TDS	T Al	T Fe	T Mn
					deg C	umhos/ cm	mg/l	-	NTU	cfs	-	mg/l	mg/l	mg/l	umhos/ cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
TC-01	12/19/2025	69.8	YES	**NO**	0.1	361.3	14.01	7.29	-	9,203.87	ALS	-13.9	14	7.27	301	19.7	ND	-	0.31	0.16	0.12
TC-02	12/19/2025	62.9	YES	**NO**	0.4	368.5	14.29	7.44	-	7,656.21	ALS	-17.3	14	7.26	326	22.4	ND	-	0.37	0.12	0.18
TC-03	12/19/2025	44.1	NO	YES	1.1	375.6	12.38	7.55	-	6,078.01	ALS	-9.6	12	7.23	333	26.2	ND	-	0.63	0.14	0.33
TC-04	12/19/2025	33.7	NO	YES	0	657.5	13.23	7.4	-	1,996.53	ALS	-47.8	42	7.65	658	14.6	ND	-	0.24	0.25	0.22

Note: taken from 2018 Integrated report justification submitted by SRBC

Tomhicken Creek Delisting

Table 3. D-TC01 and TC-02 Habitat Scores

Site Name	D-TC01	D-TC02
Date	12/19/2016	12/19/2016
Epifaunal Substrate	12	15
Instream Cover	13	14
Embeddedness	12	16
Velocity/Depth Regimes	16	18
Sediment Deposition	18	16
Channel Flow Status	18	16
Channel Alteration	18	16
Frequency of Riffles	13	12
Condition of Banks	16	12
Condition of Left Bank	8	7
Condition of Right Bank	8	5
Vegetative Protective Cover	15	12
Vegetative Protective Cover Left Bank	7	7
Vegetative Protective Cover Right Bank	8	5
Riparian Vegetative Zone Width	17	10
Riparian Vegetative Zone Width Left Bank	8	5
Riparian Vegetative Zone Width Right Bank	9	5
Total Habitat Score	**168**	**157**
Indicate if Glide/Pool	NO	NO

Note taken from 2018 integrated report justification submitted by SRBC

Tomhicken Creek Delisting

Tomhicken Creek Watershed
Supplemental Data for Possible Changes
to 303(d) Listings

Susquehanna River Basin Commission
February 27, 2016

Tomhicken Creek, a large tributary to Catawissa Creek, has a majority of its watershed (~14.75 stream miles listed as Impaired for Aquatic Life by Abandoned Mine Drainage (AMD) – pH. Tomhicken Creek was a watershed suggested by DEP for delisting due to stream water quality improvements caused by two large AMD treatment systems on the Oneida Outfalls.

Field activities included water quality and macroinvertebrate sampling and habitat assessment at four stations within the watershed, on December 19, 2016. Macroinvertebrate data were collected by compositing six d-frame kicks from riffles in the reach. Macro data was then run through PADEP's IBI (2013).

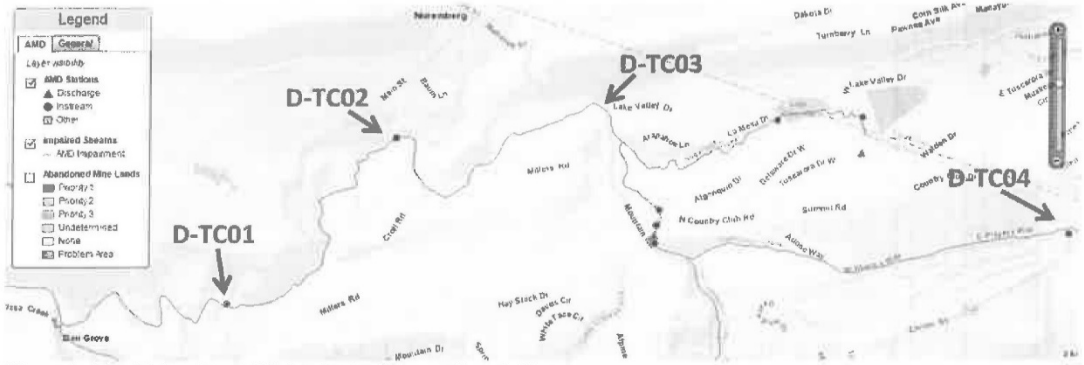


Figure 1. Tomhicken Creek Watershed with sampling station.

Results from the review of the data are detailed below. Results are listed in Tables 1, 2, and 3. Raw macroinvertebrate data are included in Appendix A. Field habitat sheets are included as Appendix B.

Station D-TC01: Tomhicken Creek (Reach Code: 02050107000392 - COMID: 65641477)

- IBI score of 69.8, water quality that shows no sign of AMD impact, and a habitat score of 168.
- SRBC recommends that this stretch of stream (cumulative length of ~1.75 miles) be delisted.

Station D-TC02: Tomhicken Creek (Reach Code: 02050107000392 - COMID: 65641477, 65641291)

- IBI score of 62.9, water quality that shows no sign of AMD impact, and a habitat score of 157.
- SRBC recommends that this stretch of stream (cumulative length of ~1.74 miles) be delisted.

The two other Tomhicken Creek stations (D-TC03 & D-TC04) did not meet IBI standards and the remaining sections of Tomhicken Creek should remain impaired for AMD – pH.

Note taken from 2018 integrated report justification submitted by SRBC

Tomhicken Creek Restoration Projects

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