Project Design

Engineering Design Description:

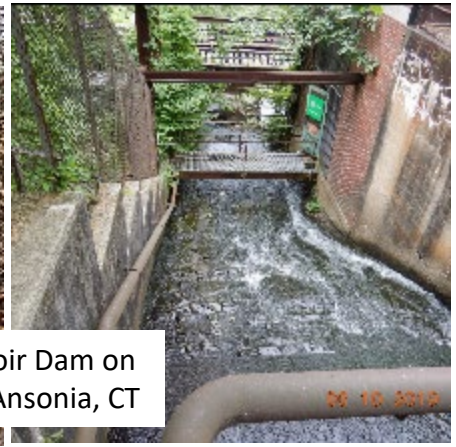
The Conceptual Design Plans attached below include the full removal of the Kinneytown Dam, the first barrier upstream of the Long Island Sound, and the removal of the associated Canal Reservoir Dam at Unit 2 in Ansonia. Floods have twice wiped out the Kinneytown Dam, once in 1910 and again in 1955, and the dam was twice rebuilt (see original dam design plans and 1957 As-Builts attached below, along with repair plans from 1980 and 1984). CTDEEP, USFWS, and the dam owner have already identified complete removal of the dam as the most feasible and effective solution to restore the Naugatuck River while reducing the numerous liabilities and safety issues relating to the aging dam infrastructure. Sediment quantity, quality, and physical characteristic data exist from the dams that were previously removed upstream, along with engineering reports, hydrologic and hydraulic models of the entire Naugatuck River, and extensive archeological and historic analysis of the Naugatuck River dams. Additional existing data includes 1-foot contour mapping from 2016; video records of the fish reaching the base of the dam; eDNA data collected downstream of the dam to identify the species of fish present; as-built engineering plans of the two sewer siphons that will need to be relocated during dam removal (see attached below); CTDEEP dam safety records stating that the dam is classified as a Significant Hazard Dam in need of repair; and a Plan to Restore Diadromous Fishes to the Naugatuck River that has just been updated and presented by CTDEEP. The Diadromous Fish Plan recommends the removal of the Kinneytown Dam as the preferred option to restore historic fish runs to the Naugatuck River.

The project team has identified potential transformational habitat zones within the impoundment and downstream extending to the Long Island Sound Estuary that have the potential for enhancement/nourishment due to passive transport of impounded sediment post-dam removal. In addition, the project team has developed a Conceptual Plan for Dam Removal, and budgets for the Engineering, Permitting, Bid Assistance, and Construction Administration. In addition, we have worked with a contractor experienced in large-scale dam removal projects in the northeast to develop the initial estimate of cost for the demolition of the Kinneytown Dam and the restoration of the Naugatuck River. The preferred sediment management method for dam removal still needs to be agreed upon by the regulatory agencies, but at this time we are assuming that the sediment can be managed by hydraulically dredging and relocating on-site a portion of the sediment while allowing the remaining sediment to be passively transported downstream to enrich and transform the riverine wetlands and estuary downstream. We have prepared estimates of probable cost for two hydraulic dredge options (see Construction Cost attached below). The first lower-cost option would focus on hydraulically dredging the top four feet of sediment from the wetted impoundment, which is where the majority of exceedances existed for the 5 mainstem dams removed between 1999 and 2004. The second higher-cost option would hydraulically dredge the potentially mobile portion of the impounded sediment. The hydraulically dredged spoils would be sluiced down the existing canal that parallels the river's eastern bank into the Coe Pond and stabilized and capped. The Canal Reservoir Dam, which currently impounds Coe Pond, will also be removed and transformed into a cascade or waterfall feature paralleled by pedestrian access extending under the existing railroad bridge in this area. The tributary extending into Coe Pond will be restored on the newly graded surface of the former impoundment and the former Coe Pond site will then be revitalized as part of the existing Naugatuck River Greenway plans. This will allow for the reconnection of the adjacent underserved community to the Naugatuck River, which is currently blocked from river access by a large chain-link fence that will be removed. The project will also investigate opportunities to replace the current energy produced by the hydroelectric facility with solar energy. A Timeline for this work, with key milestones, is attached below.

Contents:

Conceptual Dam Removal Plans for Kinneytown Dam

Kinneytown Dam on the Naugatuck River in Seymour, CT



Canal Reservoir Dam on Coe Pond in Ansonia, CT

D/S Sewer siphon x-ings to be resize to accommodate flows from 2 U/S siphon relocations

Wastewater Treatment Plant

Powerhouse & Ex. Fishway

Coe Pond

Canal to Coe Pond to be filled and restored with a greenway

Route 8

Extent of impounded sediment to be hydraulically dredged

Canal Reservoir Dam (aka Ansonia Unit 2) to be removed and cascade or waterfall feature to be constructed

Kinneytown Dam to be removed

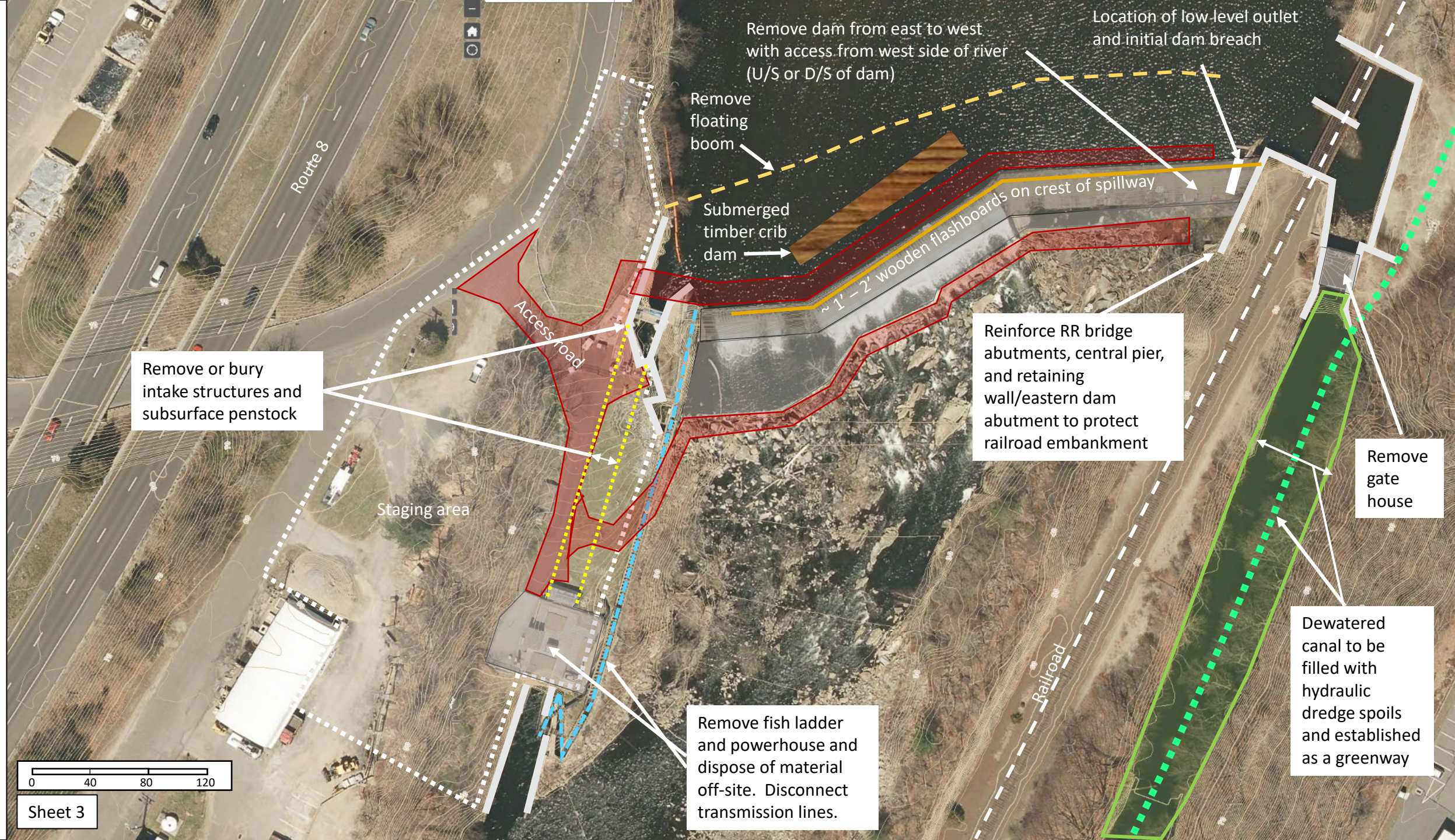
Sewer siphon x-ings to be relocated

Railroad

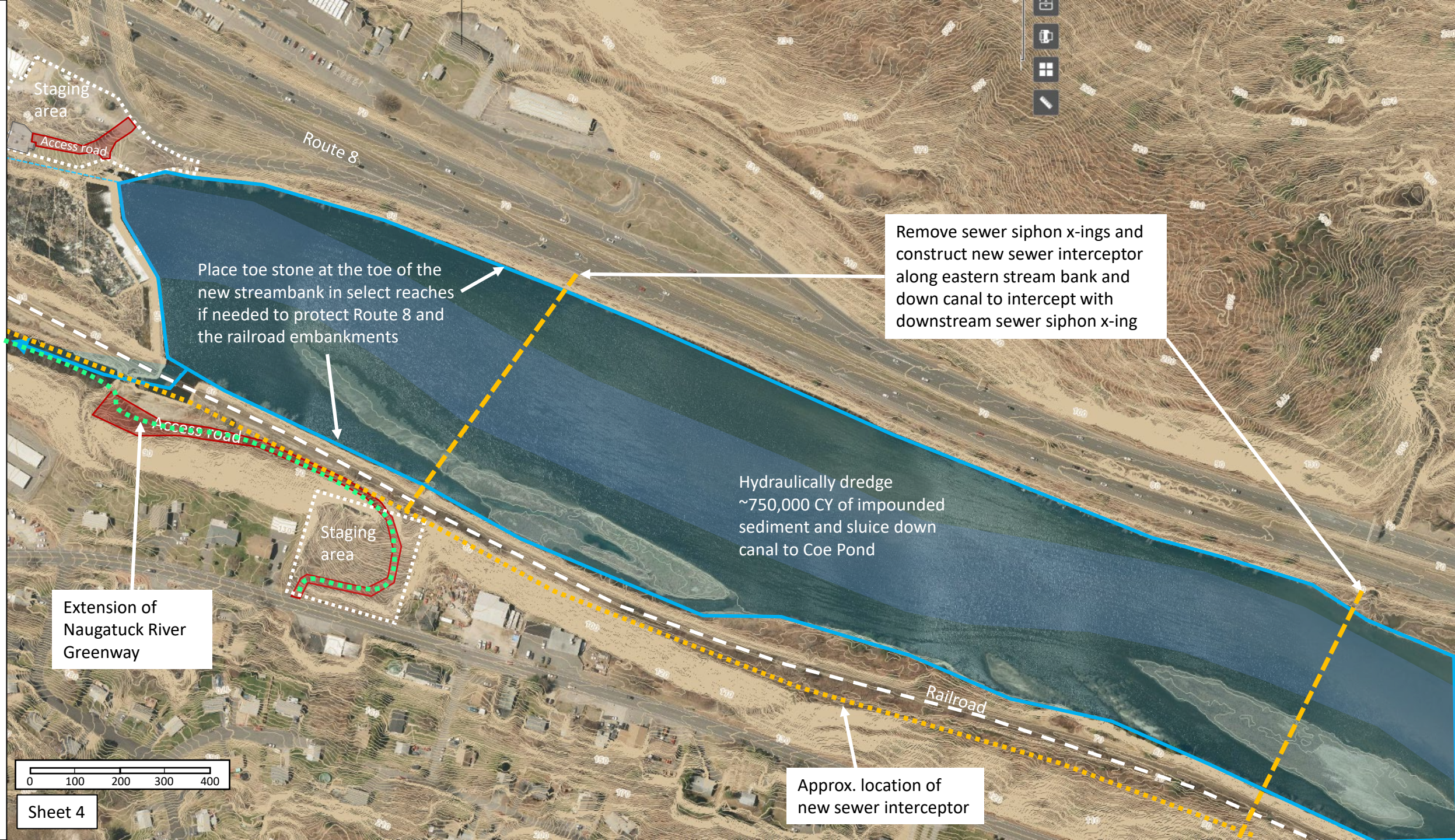
Listed EJ Community

Sheet 2

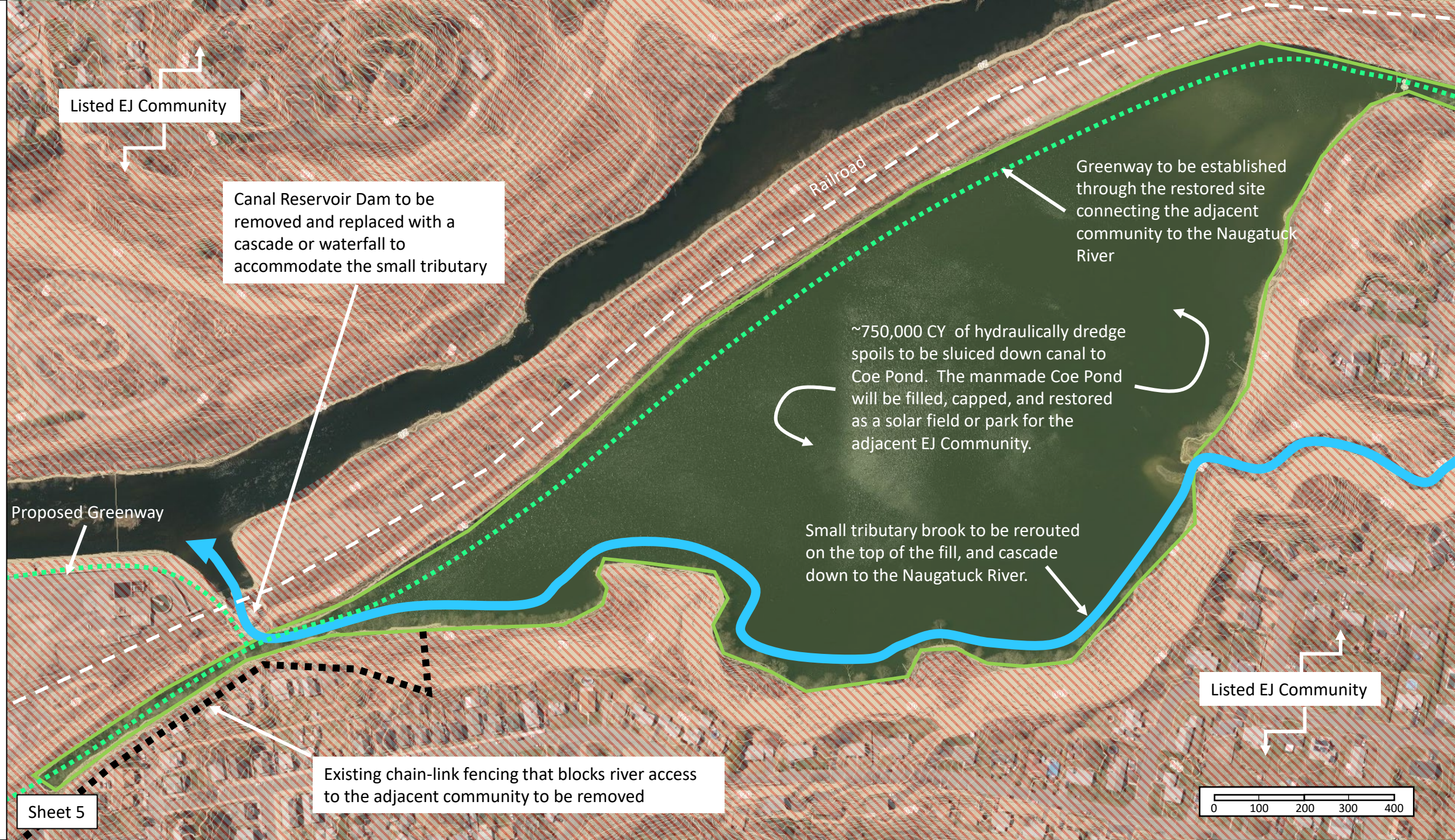
Conceptual Dam Removal Plans for Kinneytown Dam



Conceptual Dam Removal Plans for Kinneytown Dam

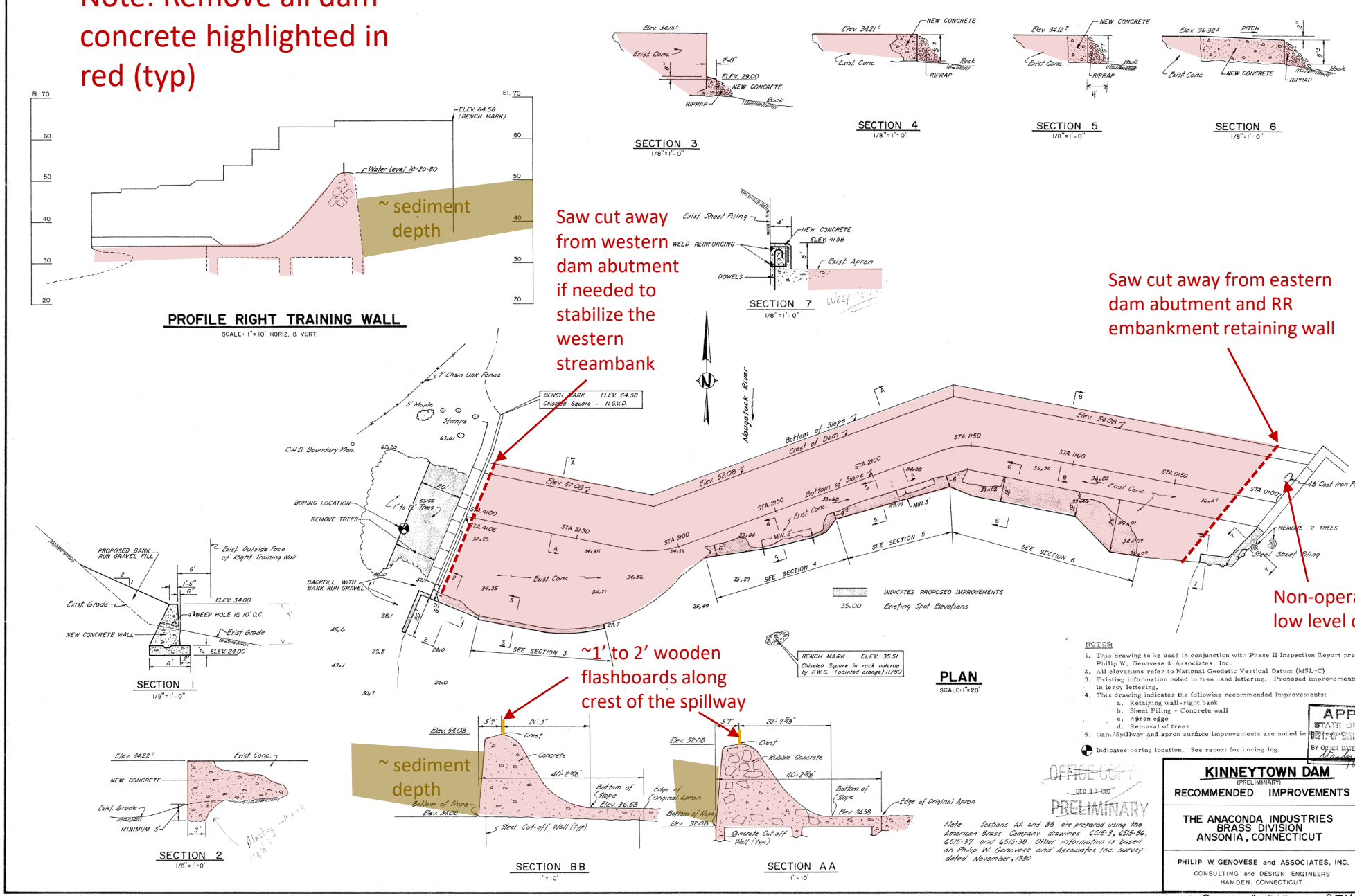


Conceptual Dam Removal Plans for Kinneytown Dam



Conceptual Dam Removal Plans for Kinneytown Dam

Note: Remove all dam concrete highlighted in red (typ)



CT Dam Inv. #12405 – SEYMOUR

1980 base plan

Sheet 6

Anaconda Dam Removal
Sediment Profile Photos
Oct 2002

This is the layer that had a higher level of contamination that was evident on the 5 dam removals in 1999-mid 2000s. It was typically seen ~2 feet below the top of impounded sediment.

1998 Sediment Testing Results from the Upstream Dams, prior to their Removal

Test Parameter	Direct Exposure Criteria[1] Residential Area	Direct Exposure Criteria[1] Industrial Area	Pollutant Mobility Criteria GA,GAA Area	Pollutant Mobility Criteria GB Area	Tingue Dam - Seymour TG01 0'-2'	TG01 4'-6'	TG02 0'-2'	TG03 0'-2'	TG03 7'-9'	TG04	TG05	Union City Dam - Naugatuck UC01 0'-2'	UC02 0'-2'	UC03 0'-2'	UC04	Platt's Mill Dam - Seymour PM01 0'-2'	PM01 2'-4'	PM02 0'-2'	PM02 2'-4'	PM03 2'-4'	PM04	PM05	Freight Street Dam Waterbury FS01 0'-2'	FS03 0'-2'	FS04	FS05	Plume & Attwood Dam - Thomaston PA01 0'-6'	PA02 0'-9"	PA03 0'-6"	PA04	Bray's Buckle Dam - Waterbury BB01 0'-2'	BB01 5'-6'	BB02 0'-2'	BB02 4'-6'	BB03 0'-2'	BB03 4'-6'	BB04	Anaconda Dam - Waterbury AD01 0'-2'	AD02 0'-2'	AD03 0'-2'	AD04
Volatile Organic Substances (ppm)																																									
Acetone	500	1000	14	140																																					
Acrylonitrile	1.1	11	0.01	0.1																																					
Benzene	21	200	0.02	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	78	720	0.08	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	500	1000	8	80	0.00469	0.00358	0.00634	0.00255	0.00213	0.00172	0.00120	ND	ND	ND	0.00241	ND	ND	ND	ND	ND	0.00118	ND	ND	ND	0.00261	ND	ND	ND	ND	ND	0.00105	0.00621	ND	ND	ND	0.00355	0.00154	ND	0.02591	0.00340	0.00153
Carbon tetrachloride (Tetrachloromethane)	4.7	44	0.1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	500	1000	2	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	100	940	0.12	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00114	ND	ND	ND	0.00111	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	7.3	68	0.01	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	500	1000	3.1	3.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	500	1000	12	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	26	240	1.5	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	500	1000	1.4	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	6.7	63	0.02	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	1	9.5	0.14	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	500	1000	1.4	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	500	1000	2	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00224	ND	ND	0.00205	0.00180	ND	ND	0.00239	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	9	84	0.1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	3.4	32	0.01	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	500	1000	10.1	10.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylene dibromide (EDB)	0.007	0.067	0.01	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-butyl-ether (MTBE)	500	1000	2	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00128	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl isobutyl ketone	500	1000	7	14																																					
Methylene chloride (Dichloromethane)[2]	82	760	0.1	1	ND	ND	ND	ND	ND	ND	0.58919	0.70128	ND	ND	ND	0.31171	ND	ND	0.00530	ND	ND	1.35982	ND	ND	ND	1.25962		ND	ND	ND	1.56621	ND	ND	ND	ND	ND	1.76289	0.00209	ND	ND	0.95993
Styrene	500	1000	2	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	24	220	0.02	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	3.1	29	0.01	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	12	110	0.1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	500	1000	20	67	ND	ND	ND	0.00195	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	500	1000	4	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	11	100	0.1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	56	520	0.1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00106			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	0.32	3	0.04	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00997	ND	ND	0.00107	0.00147	ND	ND	0.00672	ND				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	500	1000	19.5	19.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semivolatile Substances (ppm)																																									
Acenaphthylene	1000	2500	8.4	84	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.140	ND
Anthracene	1000	2500	40	400	1.097	ND	ND	ND	ND	ND	0.173	0.153	1.674	ND	ND	0.281	0.143	0.329	ND	0.429	ND		ND	ND	0.823		0.223	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.153	ND	0.115	ND
Benzo(a)anthracene	1	7.8	1	1	1.013	ND	0.300	ND	ND	0.164	1.032	0.140	0.955	0.323	0.268	0.783	0.455	1.464	0.187	0.439	0.339		0.102	0.122	0.512		0.595	ND	0.113	0.172	0.216	0.219	0.271	0.674	0.290	0.647	0.314	0.141	0.113	1.046	0.149
Benzo(b)fluoranthene	1	7.8	1	1	2.216	0.372	ND	ND	ND	ND	1.672	0.278	1.701	0.730	0.473	1.468	0.835	3.111	0.393	0.783	0.985		ND	ND	0.776		1.181	ND	0.361	ND	0.366	0.379	0.359	1.612	0.473	1.122	0.549	0.300	0.363	1.136	0.231
Benzo(k)fluoranthene	8.4	78	1	1	1.791	ND	ND	ND	ND	ND	0.830	ND	0.778	0.356	0.288	0.702	0.472	1.288	ND	ND	0.532		ND	ND	0.537		0.569	ND	ND	ND	0.327	0.332	0.336	1.038	0.707	0.660	0.238	0.235	0.393	0.808	ND
Benzo(a)pyrene	1	1	1	1	1.138	ND	ND	ND	ND	0.244	1.402	ND	1.088	0.418	0.372	0.854	0.464	ND	0.210	ND	0.751		ND	ND	0.724		0.791	ND	ND	ND	ND	0.293	0.367	0.931	ND	0.667	0.402	ND	ND	0.353	ND
Bis(2-Chloroethyl)ether	0.8	5.2	1	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-chloroisopropyl)ether	8.8	82	1	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethyl hexyl)phthalate	44	410	1	11	1.348	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.318	0.468	ND	ND	ND		ND	ND	ND			ND	ND	ND	ND	ND	ND	0.391	0.249	ND	ND	ND	ND	ND	ND
Butyl benzl phthalate	1000	2500	20	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-chlorophenol	340	2500	1	7.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butyl phthalate	1000	2500	14	140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																				
Di-n-octyl phthalate	1000	2500	2	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																				
2,4-Dichlorophenol	200	2500	1	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																				
Flouranthene	1000	2500	5.6	56	0.790	0.257	0.422	0.218	0.209	0.246	1.300	0.756	2.044	0.699	0.383	1.554	0.996	3.054	0.532	0.5																					
Flourene	1000	2500	5.6	56	ND	ND	ND	ND	ND	ND	ND	ND	0.191	ND	ND	0.151	ND	0.158	ND	h																					
Hexachloroethane	44	410	1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Hexachlorobenzene	1	3.6	1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Naphthalene	1000	2500	5.6	56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.157	ND	ND	ND	h																					
Pentachlorophenol	5.1	48	1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Phenanthrene	1000	2500	4	40	1.103	0.270	0.404	0.201	ND	0.257	1.490	0.628	1.726	0.585	0.522	1.478	0.833	2.100	0.443	0.4																					
Phenol	1000	2500	80	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Pyrene	1000	2500	4	40	0.580	0.179	0.293	ND	ND	0.133	1.084	0.612	1.679	0.618	0.278	1.410	0.883	2.876	0.470	0.4																					
Inorganic Substances (ppm)																																									
Antimony (Sb)	27	8,200	0.006	0.06	ND	ND	ND	ND	ND	ND	0.2	1.0	ND	0.5	0.2	ND	0.6	3.5	ND	0																					
Arsenic (As)	10	10	0.05	0.5	0.9	1.5	1.3	1.4	2.4	ND	ND	0.7	1.0	0.7	0.1	1.1	1.7	0.8	1.4	1																					
Barium (Ba)	4,700	140,000	1	10	23.0	22.3	28.2	30.4	27.3	16.2	17.5	26.5	25.9	19.1	18.2	24.7	27.4	20.1	20.4	16																					
Beryllium (Be)	2	2	0.004	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Cadmium (Cd)	34	1,000	0.005	0.05	0.8	0.4	0.3	0.5	0.5	0.2	0.3	0.8	ND	0.5	0.3	ND	0.8	0.3	ND	0																					
Chromium, Trivalent	3,900	51,000																																							
Chromium, Hexavalent	100	100																																							
Chromium, Total (Cr)			0.05	0.5	19.3	34.0	17.7	49.7	39.9	22.8	85.5	52.0	21.1	18.8	35.7	27.5	36.6	32.6	40.2	27																					
Copper (Cu)	2,500	76,000	1.3	13	64.1	154.5	40.0	114.9	99.5	136.6	301.9	121.6	105.4	76.0	42.5	125.8	520.6	228.7	176.5	204																					
Cyanide	1,400	41,000	0.12	2																																					
Lead (Pb)	500	1,000	0.015	0.15	23.0	21.5	16.6	20.5	18.3	12.7	57.4	25.4	24.6	77.0	36.2	105.9	38.7	31.9	38.0	175																					
Mercury (Hg)	20	610	0.002	0.02	0.28	0.03	ND	0.03	0.02	0.018	0.025	0.03	ND	0.03	0.015	0.02	0.12	ND	0.03	0.1																					
Nickel (Ni)	1,400	7,500	0.1	1	12.7	19.3	10.2	18.8	14.0	13.1	14.10	17.2	13.0	14.0	11.6	17.7	16.1	19.9	12.3	13																					
Selenium (Se)	340	10,000	0.05	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Silver (Ag)	340	10,000	0.036	0.36	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Thallium (Tl)	5.4	160	0.005	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	h																					
Vanadium (V)	470	14,000	0.05	0.5	12											17.4	0.5	11.8	11.5	9																					
Zinc (Zn)	20,000	610,000	5	50	105											96.9	199.6	125.6	96.5	54																					
Pesticides, PCB's, and TPH (ppm)																																									
Alachlor	7.7	72	0.23	0.4																																					
Aldicarb	14	410	1	1																																					
Atrazine	2.8	26	0.2	0.2																																					
Chlordane	0.49	2.3	0.066	0.066	Ni											ND	ND	ND	ND	h																					
Dieldrin	0.038	0.36	0.007	0.007	Ni											0.00386	ND	ND	0.0101	h																					
Endrin	20	610			Ni											0.00238	0.00662	0.00202	0.0123	0.002																					
2-4 D	680	20000	1.4	14	Ni											ND	ND	ND	ND	h																					
Heptachlor epoxide	0.067	0.63	0.02	0.02	Ni											ND	ND	ND	0.0133	h																					
Heptachlor	0.14	1.3	0.013	0.013	Ni											ND	ND	ND	ND	h																					
Lindane (Gamma-BHC)	20	610	0.02	0.04	Ni											ND	ND	ND	ND	h																					
Methoxychlor	340	10000	0.8	8	Ni											ND	ND	ND	ND	h																					
Toxaphene	0.56	5.2	0.33	0.6	Ni											ND	ND	ND	ND	h																					
Simazine			0.8	8																																					
PCB's (Aroclor 1260)	1	10	0.0005	0.005	Ni											0.2017	0.7534	0.0505	1.624	0.07																					
TPH	500	2500	500	2500	22											54.0	65.0	70.7	47.8	64																					

Over Residential Direct Exposure Criteria, but not Industrial

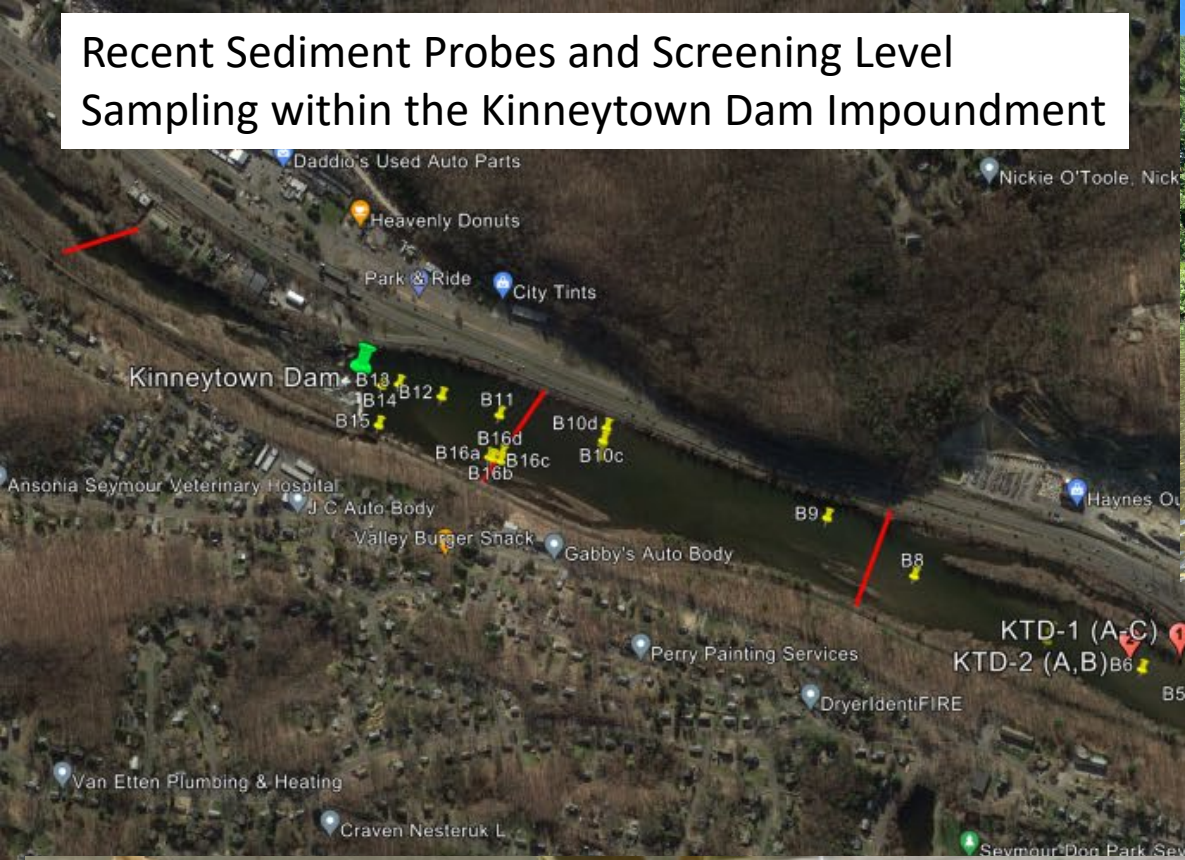
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(a)pyrene
- Bis(2-ethyl hexyl)phthalate
- Dieldrin
- PCB's (Aroclor 1260)

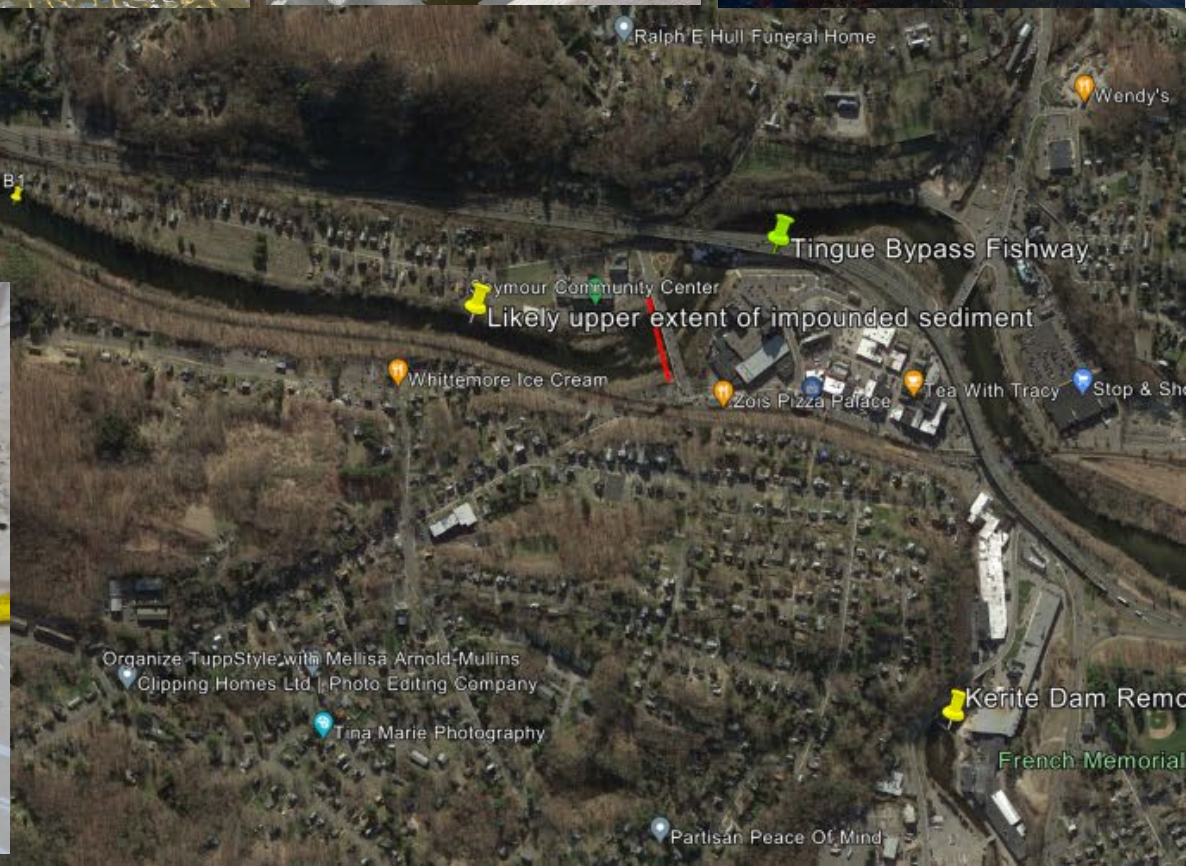
Testing Results - TCLP Analysis

Test Parameter	Direct Exposure Criteria Residential Area	Direct Exposure Criteria Industrial Area	Pollutant Mobility Criteria GA,GAA Area	Pollutant Mobility Criteria GB Area	Platts Mill PM1	Brays Buckle BB2 4'-6'
Inorganic Substances (ppm)						
Antimony (Sb)	27	8,200	0.006	0.06	ND	ND
Arsenic (As)	10	10	0.05	0.5	0.006	ND
Barium (Ba)	4,700	140,000	1	10	0.35	0.644
Beryllium (Be)	2	2	0.004	0.04	ND	ND
Cadmium (Cd)	34	1,000	0.005	0.05	**0.028**	ND
Chromium, Total (Cr)			0.05	0.5	0.038	ND
Copper (Cu)	2,500	76,000	1.3	13	0.754	**1.302**
Lead (Pb)	500	1,000	0.015	0.15	**0.144**	**0.794**
Mercury (Hg)	20	610	0.002	0.02	ND	ND
Nickel (Ni)	1,400	7,500	0.1	1	**0.296**	0.098
Selenium (Se)	340	10,000	0.05	0.5	ND	ND
Silver (Ag)	340	10,000	0.036	0.36	ND	ND
Thallium (Tl)	5.4	160	0.005	0.05	ND	ND
Vanadium (V)	470	14,000	0.05	0.5	ND	ND
Zinc (Zn)	20,000	610,000	5	50	3.448	0.468
PCB's (ppm)						
PCB's (Aroclor 1260)	1	10	0.0005	0.005	ND	ND

note: **bold** type indicates exceedence of pollutant mobility remediation criteria

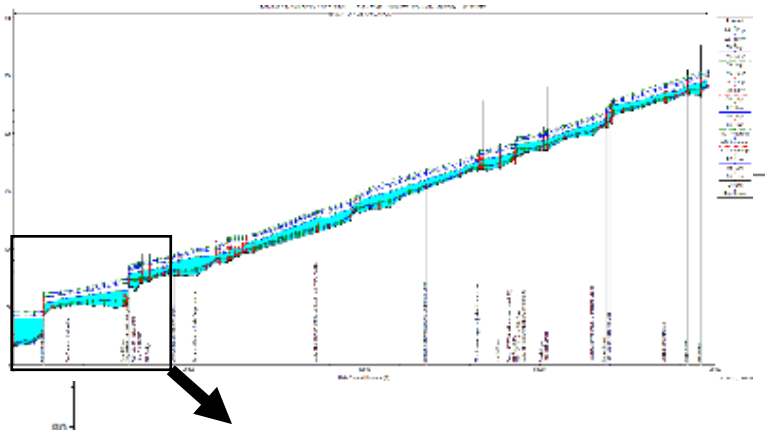
Recent Sediment Probes and Screening Level Sampling within the Kinneytown Dam Impoundment





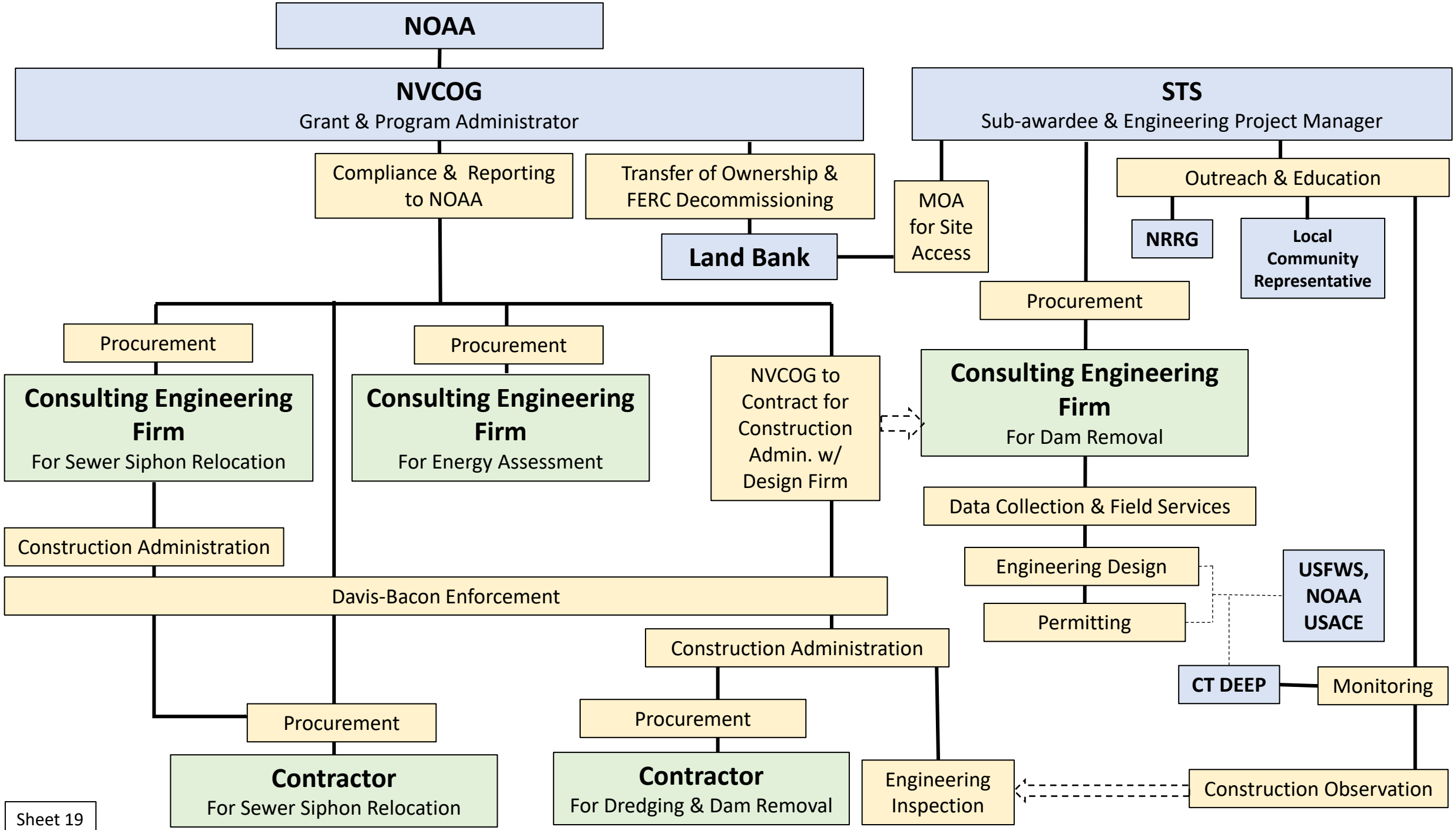
Conceptual Dam Removal Plans for Kinneytown Dam

Naugatuck River HEC-RAS Water Surface Profile



Sheet 7

Project Organizational Chart for Work Flow



Project Name: Kinneytown Dam Removal Construction - Construction Contractor (TBD)
River Name: Naugatuck River
Location: Seymour, CT

Estimate of Probable Construction Cost (based on conceptual design)

Task #	Task	Quantity (low estimate)	Quantity (high Estimate)	Unit	Cost Alt (low estimate)	Cost Alt 2 (high estimate)	Comments
1	Mobilization/Demobilization Dam Removal	1	1	EA	$ 1,000,000.00	$ 1,500,000.00	Dam Removal mob/demob is based off 5% on the total before contingency
2	Mobilization/Demobilization Hydraulic Dredge	1	1	EA	$ 3,300,000.00	$ 3,300,000.00	Hydraulic dredge mobilization/demob is $3.3million and is site-specific
3	Stakeout Survey	1	1	LS	$ 150,000.00	$ 250,000.00	
4	Install E&S Controls	15,000	15,000	LF	$ 105,000.00	$ 120,000.00	~$7/LF for low end; ~$8/LF for high end
5	Install Site Access Controls (i.e. blaze orange fencing and signage)	1	1	LS	$ 25,000.00	$ 50,000.00	
6	Install Eastern and Western Access Roads	2	2	EA	$ 35,000.00	$ 45,000.00	Access to edge of water
7	Clearing & Grubbing	1	1	LS	$ 50,000.00	$ 100,000.00	
8	Electrical Disconnection	1	1	LS	$ 35,000.00	$ 50,000.00	Assumes installation of temp. gate
9	Replace or Modify Low Level Outlet Sluice Gate for use during Dredging and Dam Removal (if needed)	1	1	LS	$ 25,000.00	$ 40,000.00	Assumes installation of temp. gate
10	Relocation of 2 Sewer Siphons and Construction of New Sewer Interceptor	1	1	LS	$ 2,920,000.00	$ 2,920,000.00	Based on a more detailed budge provided to NVCOG by local contractors and Black & Veach
11	Remove Gate House at Upstream end of Canal	1	1	LS	$ 40,000.00	$ 70,000.00	Assumes no hazardous materials
12	Preparation of Canal and Coe Pond for Transport and Disposal of Hydraulic Dredge Spoils	1	1	LS	$ 50,000.00	$ 125,000.00	Assume dewatering and straw wattles
13	Coordination with DOT and RR (as needed)	1	1	LS	$ 100,000.00	$ 200,000.00	Includes force account deposit for subervision from RR when work withing the RR ROW is ongoing
14	Install Maintenance of Traffic signage as needed for RR crossing	1	1	LS	$ 5,000.00	$ 10,000.00	
15	Monitor upstream embankments when dewatering impoundment	1	1	LS	$ 3,500.00	$ 5,000.00	
16	Remove Floating Boom from Upstream of Dam	1	1	LS	$ 10,000.00	$ 10,000.00	
17	Water Control (including removal of flashboards)	1	1	LS	$ 100,000.00	$ 150,000.00	Assume work can be done in the wet without a cofferdam
18	Sediment Management Option #1: Hydraulic Dredge and Sluice Spoils into Coe Pond	316,213	531423	CY	$ 7,570,139.22	$ 12,722,266.62	Assumes material is dredgable with a hydraulic dredge; Low end assumes that the first 4 feet of sediment within the wetted central channel (~49ac) is hydraulically dredged and sluiced into Coe Pond (over 3.5 to 4.5 months); High end assumes ~70% of the total amount of sediment is dredged based on hydrauic cross sections to determine potentially mobile sediment over 5.5 to 7.5 months); Could get hydraulic dredging permitted quickly to start dredging in year 2.
21	Remove fish ladder (off site disposal)	300		CY	$ 75,000.00	$ 110,000.00	
22	Remove powerhouse & all Appurtenance Facilities (off site disposal)	1	1	LS	$ 150,000.00	$ 350,000.00	Assumes some level of remediation (remediation alone was $125K on Saccarrappa)
23	Sawcut Spillway on Eastern & Western Ends	2	2	EA	$ 90,000.00	$ 110,000.00	
24	Repair and Stabilize Eastern Spillway Abutment	1	1	LS	$ 50,000.00	$ 150,000.00	High end include some concrete facing work
25	Stabilize Railroad Bridge Abutments and Central Pier	1	1	LS	$ 50,000.00	$ 100,000.00	Assume bridge will be dewatered post removal and that there is a concrete apron beneath the bridge
26	Remove Kinneytown Dam Spillway (moving from east to west)	9,000	9,000	CY	$ 1,350,000.00	$ 2,200,000.00	
27	Remove Timber Cribbing U/S of Kinneytown Dam	1	1	LS	$ 75,000.00	$ 90,000.00	
28	Remove/Bury Remaining Structures From Eastern Bank (i.e. retaining walls, tailraces, penstock, etc.)	1	1	LS	$ 250,000.00	$ 350,000.00	
29	Remove or stabilize through burial the Canal Reservoir Dam	1	1	LS	$ 40,000.00	$ 75,000.00	
30	Remove Canal Reservoir Dam Powerhouse	1	1	LS	$ 100,000.00	$ 250,000.00	Assumes some level of remediation (remediation alone was $125K on Saccarrappa)
31	Cap former Coe Pond Sites (to protect the public from dredge spoils)	1	1	LS	$ 6,000,000.00	$ 7,500,000.00	Includes orange demarcation layer, 1ft sand, 6" topsoil (for canal and pond)
32	Restore former Coe Pond & Canal Sites	1,760,000	1,760,000	SF	$ 224,400.00	$ 250,000.00	Assumed just seeding here
33	Restore Tributary through former Coe Pond site and construct waterfall feature at former Canal Reservoir Dam site	1	1	LS	$ 400,000.00	$ 750,000.00	Not sure what this would look like but assumed a stone lined channel
34	Construct Greenway through canal and former Coe Pond site	1	1	LS	$ 150,000.00	$ 200,000.00	Assume gravel path
35	Construct Pedestrian River Access through former Coe Pond site to Naugatuck River (under active railroad track)	1	1	LS	$ 70,000.00	$ 150,000.00	Stairway under RR Bridge and along side manamade waterfall/cascade
36	Invasive Species Management	1	1	LS	$ 50,000.00	$ 150,000.00	Just invasive plant control during construction
37	Place Stabilization on Eastern and Western Toe of Streambank Upstream to Stabilize RR and Route 8 as needed	1,000	2,000	LF	$ 400,000.00	$ 800,000.00	Estimated quantity
38	Restore access routes/staging areas as needed	1	1	LS	$ 150,000.00	$ 200,000.00	
39	Topsoil	1	1	LS	$ 400,000.00	$ 500,000.00	Most of the topsoil is carried in the Coe Pond item
40	Seed	1	1	LS	$ 50,000.00	$ 100,000.00	Most of the seed is in the Coe Pond item as I believe much of the impondment will revegatate on it's own; assumes no additional plantings
41	As-built Survey	1	1	LS	$ 50,000.00	$ 75,000.00	Assume LIDAR drone survey
42	Remove E&S controls post site stabilization	15,000	30000	LF	$ 75,000.00	$ 150,000.00	

$ 25,773,039.22	$ 36,277,266.62	Estimate of Base Cost Range
$ 5,154,607.84	$ 7,255,453.32	20% Contingency
$ 30,927,647.06	**$ 43,532,719.94**	Estimate of Construction Cost Range

$ 10,623,480.00	**$ 15,156,000.00**	Estimate of Construction Cost Range without the Sediment Work (which we assume will be covered by EPA grants)

Assumptions

Impounded sediment: Mechanical dredging and trucking to an approved disposal facility has been eliminated as an option due to the extreme cost and unlikely chance that a suitable disposal site could be found to take that much sediment; Low estimate is a partial hydraulic dredge of the first 4 feet of sediment sluiced into Coe Pond, with capping and restoration of the former Coe Pond site. High estimate is hydraulic dredge of the likely mobile fraction of the impounded sediment.

Dewatered streambed upstream will not require restoration work and will be allowed to stabilize and vegetate passively

2 sanitary sewer siphon will be relocated downstream of Kinneytown

Red text are tasks associated with sediment management

Estimate of Probable Construction Cost (based on Conceptual Design Plans)

Kinneytown Dam Removal Project Timeline

Scope, Responsibilities, & Timeline with Milestones

Task	Responsible Party	Assistance By	2023 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2024 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2025 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Administration	**NVCOG**																																					
Management of Grant	NVCOG																																					
Grant Reporting	NVCOG																																					
Project Meetings																																						
Property Access Coordination																																						
Property Acquisition (transfer of ownership)	**NVCOG**																																					
Coordination with Dam Owner																																						
Legal	NVCOG	STS																																				
Carrying Costs/ Facility Management	NVCOG																																					
Set up Conservation Easement over Site	NVCOG																																					
Project Management	**STS**	**NVCOG**																																				
Project Management for Engineering	STS																																					
Project Management for Construction	STS																																					
Project Meetings	STS																																					
Permit Coordination	STS																																					
Bid Administration	NVCOG	STS																																				
Construction Observation	STS	NVCOG																																				
Project Close Out	STS	NVCOG																																				
FERC Decommissioning	**NVCOG**	**STS**																																				
Legal	NVCOG	STS																																				
Coordination	NVCOG	STS																																				
FERC Meetings	NVCOG	STS																																				
Outreach & Education - Public Involvement	**STS**	**NRRG, NVCOG**																																				
Underserved Community Stakeholder Group	STS/NVCOG																																					
Measurement of Benefits to Underserved Communities	STS/NVCOG																																					
Envisioning Charettes with Local Communities (including River Access and Park idea for the underserved community around Coe Pond)	STS/NVCOG																																					
Educational Workshops (2) (for NGO's, Conservation Corps, Interns, early career professionals, underserved communities, policy makers, etc)	STS																																					
Public Meetings (3)	STS/NVCOG																																					
Web-based Storymap (updating by NVCOG)	NVCOG																																					
River Clean-up Events (3)	NRRG	STS																																				
Documentary Film by NRRG (highlighting history, fisheries, collaborative process, analysis, removal, restoration, and monitoring)	NRRG																																					
Press Visits (4)	STS																																					
Naugatuck River Community Celebration Event	NRRG	STS, NVCOG																																				
Dam Removal Analysis & Design	**Consulting Firm (TBD)**	**STS & NVCOG oversight**																																				
Engineering Project Management/Coordination	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Project Management/Coordination	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Project Meetings	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Regular Update Meetings/Calls	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Data Collection / Field Work	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Collection & Review of Existing Data	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Monitoring Plan	Consulting Firm (TBD)	STS & NVCOG oversight																																				
QAPP	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Wetland & Regulated Resource Delineation	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Utilities Investigation	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Property Boundaries	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Topographic Survey	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Bathymetric Survey	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Sediment Sampling Plan (& CT DEEP Signoff) (includes 4 meetings)(both impoundments)	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Sediment Probes (both impoundments)	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Mechanical Borings & Sediment Sample Collection (both impoundments)	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Upstream and Downstream Sediment Sample Collection	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Sediment Lab Analysis (physical and chemical) & Comparison to Criteria	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Historic & Archeological Report (update 1999 report and make and Section 106 recommendations)	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Natural Diversity Database Check for know Rare, Threatened, and Endangered Species	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Set Photo Points	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Set Monitoring Monuments	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Ground Penetrating Radar to Identify Underlying Riverbed and Bedrock	Consulting Firm (TBD)	STS & NVCOG oversight																																				
Easement Mapping (if needed)	Consulting Firm (TBD)	STS & NVCOG oversight																																				

PREVIEW Date: Sep 06, 2022 Workspace ID: WS00966104 Funding Opportunity Number: NOAA-NMFS-HCPO-2022-2007195

Kinneytown Dam Removal Project Timeline

Engineering Analysis	Consulting Firm (TBD)	STS & NVCOG oversight
Alternatives Analysis of Dam Removal Options	Consulting Firm (TBD)	STS & NVCOG oversight
Alternative Energy Analysis (solar replacement)	Consulting Firm (TBD)	STS & NVCOG oversight
Sediment Transport/Mobility Analysis	Consulting Firm (TBD)	STS & NVCOG oversight
Geomorphic Channel Assessment (with substrate characterization)	Consulting Firm (TBD)	STS & NVCOG oversight
Sediment Management Plan (with LEP)	Consulting Firm (TBD)	STS & NVCOG oversight
Streambank Stability Analysis (for Route 8 and RR embankments)	Consulting Firm (TBD)	STS & NVCOG oversight
Hydrologic Analysis	Consulting Firm (TBD)	STS & NVCOG oversight
Hydraulic Analysis (Water surface profile modeling and assessment of flood impacts/attenuation)	Consulting Firm (TBD)	STS & NVCOG oversight
Fish Passage Assessment	Consulting Firm (TBD)	STS & NVCOG oversight
Well Impact Assessment	Consulting Firm (TBD)	STS & NVCOG oversight
Environmental Assessment of Impacts	Consulting Firm (TBD)	STS & NVCOG oversight
Broad Street Bridge & RR Bridge Scour Assessment	Consulting Firm (TBD)	STS & NVCOG oversight
Engineering Design	Consulting Firm (TBD)	STS & NVCOG oversight
Project Design Renderings	Consulting Firm (TBD)	STS & NVCOG oversight
Invasive Species Management Plan	Consulting Firm (TBD)	STS & NVCOG oversight
Restoration & Planting Plan	Consulting Firm (TBD)	STS & NVCOG oversight
Preliminary Engineering Design Plans	Consulting Firm (TBD)	STS & NVCOG oversight
Preliminary Basis of Design Report	Consulting Firm (TBD)	STS & NVCOG oversight
Preliminary Engineers Estimate of Probable Cost (with Contractor Input/Review)	Consulting Firm (TBD)	STS & NVCOG oversight
Preliminary Technical Specifications	Consulting Firm (TBD)	STS & NVCOG oversight
Final Design Plans (includes E&S, construction sequencing, profile, x-sections, sediment depths, restoration plan, planting, invasive species management, details, notes, etc)	Consulting Firm (TBD)	STS & NVCOG oversight
Final Basis of Design Report	Consulting Firm (TBD)	STS & NVCOG oversight
Final Engineer's Estimate of Probable Cost	Consulting Firm (TBD)	STS & NVCOG oversight
Final Bid Package (Front end and technical specifications) with Bid Form & Quantities	Consulting Firm (TBD)	STS & NVCOG oversight
Monitoring Recommendations	Consulting Firm (TBD)	STS & NVCOG oversight
Revision of Bid Documents (plans, report, cost and bid package based on regulatory input and final permits)	Consulting Firm (TBD)	STS & NVCOG oversight
Permitting	Consulting Firm (TBD)	STS & NVCOG oversight
Coordination with Resource Agencies	Consulting Firm (TBD)	STS & NVCOG oversight
NEPA (utilizing NOAA's PEIS for restoration)	Consulting Firm (TBD)	STS & NVCOG oversight
Initial Regulatory Consultation (3)	Consulting Firm (TBD)	STS & NVCOG oversight
Pre-Application Meetings (3)	Consulting Firm (TBD)	STS & NVCOG oversight
State Permits (Dam Safety, Fisheries Review, Remediation Review, 401, Diversion, Flood Management, Stormwater, etc)	Consulting Firm (TBD)	STS & NVCOG oversight
ACOE Permit	Consulting Firm (TBD)	STS & NVCOG oversight
Local Permits (may have stormwater review, flood management, etc)	Consulting Firm (TBD)	STS & NVCOG oversight
Public Meetings (2)	Consulting Firm (TBD)	STS & NVCOG oversight
Section 106 Consultation		
Permit Close Out Requirements	Consulting Firm (TBD)	STS & NVCOG oversight
Bid Assistance	Consulting Firm (TBD)	STS & NVCOG oversight
Respond to Contractors Questions Re: Design and Bid Package	Consulting Firm (TBD)	STS & NVCOG oversight
Review Bids & Make Recommendations	Consulting Firm (TBD)	STS & NVCOG oversight
Assist with Negotiations for Construction Costs	Consulting Firm (TBD)	STS & NVCOG oversight
Construction Management	Consulting Firm (TBD)	STS & NVCOG oversight
Construction Management	Consulting Firm (TBD)	STS & NVCOG oversight
Construction Oversite/Inspection Services	Consulting Firm (TBD)	STS & NVCOG oversight
Review & Approve Submittals	Consulting Firm (TBD)	STS & NVCOG oversight
Weekly Construction Meetings	Consulting Firm (TBD)	STS & NVCOG oversight
Construction Close Out	Consulting Firm (TBD)	STS & NVCOG oversight
Regulatory Close Out	Consulting Firm (TBD)	STS & NVCOG oversight
Bidding Administration	**NVCOG**	**STS**
Bidding Administration		
Construction/ Dam Removal & Restoration (See detail of final tab)	**Contractor (TBD)**	**STS and NVCOG Oversight**
Hydraulic Dredge		
Dam Removal Construction		
Pre-, During, and Post-Removal Monitoring (with Development of Monitoring Plan)	**STS**	
Monitoring		

Assumption: This assumes the award will be granted in 2022 with enough time to put the engineering out to bid and select and engineering firm to start work on January 1, 2023
The timeline is dependent on receiving funding for the entire project and on the final sediment management plan, as approved by the regulators.