

## APPENDIX A: DETAILED COST ESTIMATES

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Table A-1. Summary of sediment removal alternatives

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO.	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Project Costs For Sediment Removal			CHECKED BY:	
				CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2	Sediment Removal Alternative 1a	1	LS	\$57,400,000	\$57,400,000
3	Hydr. Dredging - Cascade Landfill (Peck Rd) Prop. For Sed. Disposal				
4					
5	Sediment Removal Alternative 1b	1	LS	\$77,100,000	\$77,100,000
6	Hydraulic Dredging - Hardy Road Landfill Property Disposal				
7					
8	Sediment Removal Alternative 2	1	LS	\$63,500,000	\$63,500,000
9	Mechanical Dredging - Landfill Or Upland Site for Sediment Disposal				
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20	<b>Note: Costs Shown Above Include the Following:</b>				
21	-- Mobilization & Demobilization				
22	-- Bonds & Insurance				
23	--Lands & Damages Allowances				
24	--Contingency				
25	--Project Engineering & Design				
26	--Construction Review				
27					
28	<b>Note: Other Project Costs Not Included:</b>				
29	--OMRRR				
30	-- Environmental Studies and/or Remediation				
31	-- Legal and Administration				
32	--Property Acquisition Costs For Disposal				

Table A-2. Costs for Sediment Removal Alternative 1a

<b>OPINION OF PROBABLE CONSTRUCTION COST</b>					
<b>TETRA TECH</b>					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO.	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Sediment Removal Alternative 1a			CHECKED BY:	
	Hydr. Dredging - Cascade Landfill (Peck Rd) Prop. For Sed. Disposal			CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2					
3					
4	<b>At Upper Pool Area</b>				
5	Erosion Control Allowance for Equipment Access	1	LS	\$20,000.00	\$20,000
6	Mobilization/Demobilization of 12" Hydraulic Dredge; Job Trailer At Upper Pool, Temp. Power, etc.	1	LS	\$500,000.00	\$500,000
7	Hydraulic Discharge Line, 12" With 1 Booster Pump	14,300	LF	\$8.74	\$125,000
8					
9	<b>Operations At Upper Pool Area</b>				
10	Dredging, 12" hydr dredge; 7 Days/Week @ 16+ Hrs/Day W/Crew, & Support; 2,750 to 3,200 CY/Day Rate; Includes 1 Unmanned Booster Pump	270	DAY	\$45,000.00	\$12,150,000
11	Disposal of Non-Sediment Waste Materials To Landfill, Allowance	1	LS	\$40,000.00	\$40,000
12	Polymer for Hydraulic Dredging	800,000	CY	\$5.50	\$4,400,000
13	Polymer Feed Equipment, Chem Feed Operators, 10 MO	800,000	CY	\$2.60	\$2,080,000
14					
15					
16	<b>At Cascade Landfill Site</b>				
17	Mobilization/Demobilization of Earth Moving, and Other Equipment Required for Bags Deployment	1	LS	\$300,000.00	\$300,000
18	Install/Remove Temporary Perimeter Security Fence W/Gates	6,000	LF	\$24.00	\$144,000
19	Initial Erosion Control Allowance	1	LS	\$30,000.00	\$30,000
20	Clear & Grub Site	35	AC	\$9,000.00	\$315,000
21					
22	<b>Construct Perimeter Berm &amp; Basin Around Disposal Area</b>				
23	Imported Soil For Perimeter Berm & Future Bag Cover, Placed	97,200	CY	\$20.00	\$1,944,000
24	Construct Berm 15' High, 10' Wide Top,, 3:2 Sideslope x 5400 LF	97,200	CY	\$7.50	\$729,000
25	Construct Shallow Collection/Sedimentation Basin Alongside Berm To Collect Runoff, 5400 LF (3± MG), (In Addn To Imported Perimeter Berm Material)	16,200	CY	\$6.50	\$105,300

26	Imported Clean Granular Fill for Leveling & Liner Bedding, 12" Avg Depth Over 30 AC	48,400	CY	\$20.00	\$968,000
27	Grading of Fill Over Cascade Site	48,400	CY	\$2.50	\$121,000
28	HDPE Liner; Assume Geotextile Bags Over 26 Acres	125,840	SY	\$8.00	\$1,006,720
29	Non-Woven Geotextile Cushion Above Stone Layer, Furnish & Inst	125,840	SY	\$1.75	\$220,220
30	Washed Drain Stone Over HDPE Liner, 6" Layer In Place	31,460	TON	\$24.00	\$755,040
31	Drain Tile Underdrain Above Liner, 350' Lngths @ 20' O.C. Placed Under Bags Above Liner and Cushion Fabric	38,500	LF	\$5.50	\$211,750
32					
33	Geotextile Bags, Delivered & Installed 90' to 120' Circumference x 200'+/-	1	LS	\$4,400,000.00	\$4,400,000
34	Install/Layout of Geotextile Bags, Assume 325 @ 200' Each	325	EA	\$1,000.00	\$325,000
35	Equipment for Filling Bags	1	LS	\$50,000.00	\$50,000
36	Crew For Filling Bags During Dredging	1	LS	\$1,300,000.00	\$1,300,000
37					
38	<b>Discharge of Bag Runoff</b>				
39	Temporary Pumping of Runoff From Basin to Temporary WWTP; Temp Pump Station	1	LS	\$150,000.00	\$150,000
40	for SS Removal Only (Est. 1.24 Billion Gal Total Flow); WWTP Plant Only	1	LS	\$3,500,000	\$3,500,000
41	Operation and Maintenance of Temporary WWTP at Disposal Site	800,000	CY	\$10	\$8,000,000
42					
43	<b>Manifold &amp; Distribution Piping For Filling Bags</b>				
44	Piping Connection - Pump Line(s) To Manifold	1	LS	\$15,000.00	\$15,000
45	Main Header To Feed Distribution Piping, 18"	2,400	LF	\$40.00	\$96,000
46	Piping Fittings, Tees & Connectors	140	EA	\$85.00	\$11,900
47	8" Feed Lines @ 350 LF; Assume 35 Each	12,300	LF	\$22.00	\$270,600
48	Valves, 1 Per 8" Feed Line; 4 Avg For Bag Fill Lines	175	EA	\$175.00	\$30,625
49					
50	<b>Post-Dredging Work at Disposal Site</b>				
51	Grade Out & Cover Bags Using Perimeter Berm Material Restore Graded Material Over Geotextile Bags, Seed & Mulch	113,400	CY	\$5.50	\$623,700
52		35	AC	\$9,680.00	\$338,800
53	Temporary Erosion Control Measures Allowance	1	LS	\$40,000.00	\$40,000
54	Permanent Erosion Control Measures at Disposal Site Allowance	1	LS	\$100,000.00	\$100,000
55					
56	<b>Disposal Site Office Allowance</b>				
57	Job Trailer With Utility Drops at Disposal Site	12	MO	\$6,000.00	\$72,000
61					
62	<b>Subtotal Construction</b>				<b>\$45,488,600</b>
63					
64	<b>Construction Contingency @ 15%</b>				<b>\$6,830,100</b>
65	<b>Total Estimated Construction Cost</b>				<b>\$52,319,000</b>



Table A-3. Costs for Sediment Removal Alternative 1b

<b>OPINION OF PROBABLE CONSTRUCTION COST</b>					
<b>TETRA TECH</b>					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Sediment Removal Alternative 1b			CHECKED BY:	
	Hydraulic Dredging - Hardy Road Landfill Property Disposal			CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2	<b>At Upper Pool Area</b>				
3	Erosion Control Allowance for Equipment Access	1	LS	\$20,000.00	\$20,000
4	Mobilization/Demobilization of 12" Hydraulic Dredge; Job Trailer, Temp. Power, etc.	1	LS	\$600,000.00	\$600,000
5	Hydraulic Discharge Pipeline	14,300	LF	\$5.25	\$75,075
6	Discharge Line Booster Pumps For 12"	5	EA	\$120,000.00	\$600,000
7	Monitoring of Booster Pumps, Allowance for 2 Staff 16 Hr/Day	1	LS	\$810,000.00	\$810,000
8					
9	<b>Operations At Upper Pool Area</b>				
10	Dredging, 12" hydr dredge; 7 Days/Week @ 16+ Hrs/Day W/Crew, & Support; 3,000+ CY/Day Rate; Includes 5 Booster Pumps With 2 Staff To Monitor/Maintain Boosters	270	DAY	\$45,000.00	\$12,150,000
11	Disposal of Non-Sediment Waste Materials From Dredging To Landfill, Allowance	1	LS	\$40,000.00	\$40,000
12	Polymer for Hydraulic Dredging	800,000	CY	\$5.50	\$4,400,000
13	Polymer Feed Equipment, Chem Feed Operators, 10 MO	800,000	CY	\$2.60	\$2,080,000
14					
15					
16	<b>At Hardy Road Landfill Site</b>				
17	Mobilization/Demobilization of Earth Moving, and Other Equipment Required for Bags Deployment	1	LS	\$300,000.00	\$300,000
18	Job Trailer Including Utility Drops	12	MO	\$6,000.00	\$72,000
19	Initial Erosion Control Allowance	1	LS	\$50,000.00	\$50,000
20	Clear & Grub Site For Stockpile and Work Areas (Outside "Hill" Area)	10	AC	\$9,000.00	\$90,000
21	Document/Locate Existing Gas Collection Piping Network. Install Valving and Bypass Piping To Isolate Affected Piping During Sediment Placement. Provide For Gas Piping Reconnection at a Later Date.	1	LS	\$50,000.00	\$50,000
22	Strip and Remove Vegetation From North Side of "Hill"	44	AC	\$600.00	\$26,400

23	Strip and Stockpile Existing Topsoil Cover Material From North Side of "Hill", Assume 2' of Existing Topsoil To Be Temp. Removed and Stockpiled Onsite; Construct Temporary Containment Berm With Soil Along North Edge of Work Area; Salvaged Topsoil Is To Be Reused Eventually For Cover Over The Placed Sediment	87,000	CY	\$7.50	\$652,500
24					
25	<b>Temporary Geotextile Bag Installation For Dewatering Sediment</b>				
26	Utilize Existing Sedimentation Basin For Flow Recovery. Modify Only For Piping Changes To Accept Dewatering Bag Runoff	1	LS	\$20,000.00	\$20,000
27	Grade Out Existing Areas Outside Toe of "Hill" For Dewatering of Sediment Using Geotextile Bags, 6"+/- Cut Assumed Over 12 AC	12	AC	\$2,000.00	\$24,000
28	Install HDPE Liner Over the "Hill's Impermeable Cap" and Also Outside Toe of "Hill" (44 AC Total)	213,000	SY	\$8.00	\$1,704,000
29	Furnish and Place Imported Washed Drain Stone Over HDPE Liner In 12 AC Geotextile Bag Dewatering Area, 6" Layer In Place	14,520	TON	\$24.00	\$348,480
30	Install Drain Tile Underdrain Above Liner In Area Beyond Toe of "Hill". Tile to be Varying Lngths @ 20' O.C. Placed Under Bags and Under Cushion Fabric. Drain To Sedimentation Pond	20,000	LF	\$5.50	\$110,000
31	Geotextile Bags, Delivered & Installed 90' to 120' Circumference x 200'+/-	1	LS	\$4,400,000	\$4,400,000
32	Install/Layout of Geotextile Bags, Assume 325 @ 200' Each; Bags Are To Be Used For Dewatering and Then Will Be Wasted	325	EA	\$1,000.00	\$325,000
33	Equipment for Filling Bags	1	LS	\$50,000.00	\$50,000
34	Crews For Filling Bags During Dredge Operations	1	LS	#####	\$1,300,000
35					
36	<b>Manifold &amp; Distribution Piping For Filling Bags</b>				
37	Piping Connection - Pump Line(s) To Manifold	1	LS	\$15,000.00	\$15,000
38	Main Header To Feed Distribution Piping, 18"	2,400	LF	\$40.00	\$96,000
39	Piping Fittings, Tees & Connectors	140	EA	\$85.00	\$11,900
40	8" Feed Lines @ 350 LF; Assume 35 Each	12,300	LF	\$22.00	\$270,600
41	Valves, 1 Per 8" Feed Line; 4 Avg For Bag Fill Lines	175	EA	\$175.00	\$30,625
42					
43					
44	<b>Discharge of Bag Runoff</b>				
45	Temporary Pumping of Runoff From Basin to Temporary WWTP; Temp Pump Station	1	LS	\$150,000.00	\$150,000
46	Temporary WWTP at Disposal Site; Assume Primarily for SS Removal Only (Est. 1.24 Billion Gal Total Flow); WWTP Plant Only	1	LS	\$3,500,000	\$3,500,000
47	Operation and Maintenance of Temporary WWTP at Disposal Site	800,000	CY	\$10	\$8,000,000
48					
49	<b>Transfer of Dewatered Sediment From Geotextile Bags To "Hill" For Placement</b>				

50	Fill Bags Directly From Dredging Operations. Allow Filled Bags of Sediment to Rest and Dewater for 2 To 4 Week Period Beyond Toe of "Hill". Spilt Open Bags. Using Front End Loaders or Conveyors, Relocate Dewatered Sediment to Fill Area On North Side of "Hill". Monitor For Potential To Movement. Fill To Be Placed Over 27 Acre Slope Area and Graded/Spread Over Approximately 35 Acre Footprint Area (Approximately 14 Foot Average Fill Depth)	800,000	CY	\$15.00	\$12,000,000
51					
52	<b>Post-Dredging Work at Disposal Site</b>				
53	Dispose Of Wasted Geotextile Bags and Drain Piping. Dispose of at Operating Sanitary Landfill (Assume 400 Bags +/- Required)	400	EA	\$100.00	\$40,000
54	Restore Gas Collection System Piping	1	LS	\$50,000.00	\$50,000
55	Final Grading of All Disturbed Work Areas On Sideslope of "Hill" and Beyond Toe of Slope.	35	AC	\$1,000.00	\$35,000
56	Seed and Mulch All Disturbed Areas	35	AC	\$9,680.00	\$338,800
57	Temporary Erosion Control Measures Allowance Including Staked Erosion Batting On "Hill"	1	LS	\$40,000.00	\$40,000
58	Permanent Erosion Control Measures at Disposal Site Allowance	1	LS	\$100,000.00	\$100,000
59	Replace Salvaged Topsoil Material From Original "Hill". Grade Out 2'+/- Cover Over Sediment.	87,000	CY	\$6.50	\$565,500
60	Supplement Salvaged Topsoil Material From "Hill" With Additional Soil To Assure 2' Minimum of Topsoil Cover Over The "Hill". Assume 25% Additional Soil Required To Be Imported And Placed	21,750	CY	\$16.00	\$348,000
61					
65	<b>Subtotal Construction</b>				<b>\$55,888,800</b>
66					
67	<b>Construction Contingency @ 20%</b>				<b>\$11,189,200</b>
68					
69					
70	<b>Allowance For Disposal Site Hydro-Geotechnical/Environmental Report</b>	1	LS	\$750,000	<b>\$750,000</b>
71	<b>Project Engineering Design Allowance</b>	1	LS	\$1,680,000	<b>\$1,680,000</b>
72	<b>Construction Phase Engineering Allowance</b>	1	LS	\$4,192,000	<b>\$4,192,000</b>
73	<b>River Monitoring Program</b>	1	LS	\$300,000	<b>\$300,000</b>
74	<b>Security Webcams/Public Access Allowance</b>	1	LS	\$100,000	<b>\$100,000</b>
75	<b>Post Construction Landfill Monitoring Program Allowance</b>	3	YR	\$1,000,000	<b>\$3,000,000</b>
76					
					<b>\$77,100,000</b>

Table A-4. Costs for Sediment Removal Alternative 2

<b>OPINION OF PROBABLE CONSTRUCTION COST</b>					
<b>TETRA TECH</b>					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Sediment Removal Alternative 2			CHECKED BY:	
Mechanical Dredging - Landfill Or Upland Site for Sediment Disposal				CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Mobilization/Demobilization of Equipment Including: 2 Portable Sectional Barges w/Excavators & Crew; 2 Transport Barges; 2 Workboats; 2 Front End Loaders; 2 Dozers; Job Trailer, etc	1	LS	600,000.00	\$600,000
2	Erosion Control Measures For Both Offloading Sites Including Maintenance	1	LS	100,000.00	\$100,000
3	Mechanical Dredging, Assume 2 Dredge Barges Operating at 1000 CY/Day; 6 Days/Week; 25% Poor Weather Days	800,000	CY	18.00	\$14,400,000
4	Offload Sediment From Barges Onto Off-Road Trucks, Move to Stockpile Area Away From Shoreline to Dewater; 2000 CY/Day Total Using Both Shoreline Areas For Dewatering	800,000	CY	6.00	\$4,800,000
5	Dewater Onshore - Temporarily stockpile spoil to dewater; Move with Dozers or Front End Loaders; Utilize Both North Shore and South Shore Open Areas for Dewatering	800,000	CY	1.50	\$1,200,000
6	Load Trucks For Offsite Disposal From Either The North Shore Parking Lot Stockpiles or Old Power Plant Site Stockpiles	800,000	CY	1.50	\$1,200,000
7	Trucking; Assume Truck To Landfill Property; 35 Mile Haul Each Way Assumed	800,000	CY	18.00	\$14,400,000
8	Approx. Tipping Fee at Landfill, If Other Upland Disposal Site Is Not Located	800,000	CY	\$20.00	\$16,000,000
9	Restore South Shore Power Plant Property Including Regrading, Replace Fencing, Seeding & Mulch, etc	1	LS	\$35,000.00	\$35,000
10	Remove North Shore Paved Parking Lot Following Dewatering of Sediment	4,700	SY	\$7.50	\$35,250
11	Reconstruct North Shore Bituminous Paved Parking Lot and Base As Necessary	4,700	SY	\$25.00	\$117,500
12	Remove & Replace North Shore Parking Lot Curb & Gutter	2,010	LF	\$28.00	\$56,280
13	Reconstruct Parking Lot Lighting; Salvage and Reset Existing Lighting	1	LS	\$20,000.00	\$20,000

15	Restore North Shore Parking Lot Landscaping Allowance	1	LS	\$25,000.00	\$25,000
16					
22					
23	<b>Subtotal Construction</b>				<b>\$52,989,000</b>
24					
25	<b>Contingency @ 15%</b>				<b>\$7,112,700</b>
26					
27					
28					
29	<b>Project Engineering Design Allowance</b>	1	LS	\$1,059,780	<b>\$1,059,700</b>
30	<b>Project Construction Engineering Allowance</b>	1	LS	\$1,854,616	<b>\$1,854,600</b>
31	<b>Monitoring Program</b>	1	LS	\$300,000	<b>\$300,000</b>
32	<b>Security Webcams/Public Access Allowance</b>	1	LS	\$192,000	<b>\$192,000</b>
					<b>\$63,500,000</b>

Table A-5. Construction sequence for Sediment Removal Alternative 1a

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls, Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> CONCEPTUAL <input type="checkbox"/> PRELIMINARY <input type="checkbox"/> FINAL			ESTIMATOR:	RPN
WORK:	Preliminary Sequencing for Sediment Removal			CHECKED BY:	
Hydr. Dredging - Cascade Landfill (Peck Rd) Prop. For Sed. Disposal				CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2					
3	Install Shoreline and disposal site erosion control measures				
4	Construct temporary launch ramp for dredge and equipment				
5	Install temporary hydraulic pump line(s) from upper pool to former Cascade Landfill property generally following riverbed... distance 2.6 miles maximum				
6	Clear and grub proposed spoil disposal site of trees and brush. Approximately 30+ acres of open property would be required for all activities, subject to the future use of the property. Assume additional 2 acres needed for temporary construction yard and storage.				
7	Grade out former landfill site to flat condition to receive and use geobags for disposal. Fill as necessary. Remove all protruding concrete, stumps, etc. Construct temporary berm and collection basin around perimeter of dewatering and fill area.				
8	Construct perimeter berm around 30± acre disposal site with collection basin for runoff. Spread 6" sand layer on bottom with 40 mil HDPE liner over sand bedding. Cover liner with 6" layer of washed stone for geobags to be placed.				
9	Install temporary treatment plant for treatment of runoff and removal of sediment prior to discharge, assume 6000 gpm peak flow.				
	Spread out geobags over disposal area, typical bags to be 120' circumference by 200'+/- long, with 7' filled bag height.				
10	Construct discharge route from sedimentation basin(s) to outlet, including erosion control measures.				

11	When receiving area, geobags and bedding, manifold piping, drain lines, and associated structures have been constructed, mobilize portable dredge(s) to upper pool, including discharge pumping and booster pumps. Assume 12" and 8" dredge units. Connect dredging equipment to discharge line. Pipeline(s) will run from dredge(s) and discharge to the piping manifold feeding the geobags.				
12	Provide and test dredge and piping setup.				
13	Using bench test information for polymer optimization, commence hydraulic dredging operations, pumping sediment and transport flow to the disposal area and into the geobag network. Provide staff at disposal site to monitor filling of the geobags, rate of filling, any adjustments to piping, operate valves, and rotation of bags being filled.				
14	Continue with hydraulic dredging operations with operations; assume to run 24/7, for 6 days/week. Fill bags to roughly 7' of depth. As bags are filled, a second tier of bags is to be added above the first bag layer.				
15	Continue dredging throughout spring and summer months. Assuming a combined 300 CY/hr to 350 CY/hr & 6 days/week, work will take about 5 months.				
	When dredging of the upper pool is complete, dredge equipment is to be demobilized and removed from the upper pool via the former Power Plant location.				
	Remove geobag filling piping, treatment plant, and other appurtenances				
16	Following stabilization of sediment in the lagoon cell(s) and treatment/removal of any remaining flows, grade out excess soil material from the perimeter berms to cover filled geobags and to facilitate surface drainage. Seed and mulch the disposal location to establish vegetation.				
17	Install permanent erosion control measures.				
18	With vegetation established, abandon and restore any remaining disturbed areas				
19	Install any new plantings				
20	Removal of temporary erosion control measures				

Table A-6. Construction sequence for Sediment Removal Alternative 1b

<b>OPINION OF PROBABLE CONSTRUCTION COST</b>					
<b>TETRA TECH</b>					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> CONCEPTUAL <input type="checkbox"/> PRELIMINARY <input type="checkbox"/> FINAL			ESTIMATOR:	RPN
WORK:	Preliminary for Sediment Removal			CHECKED BY:	
	Hydraulic Dredging - Hardy Road Landfill Property Disposal			CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2					
3	Install Shoreline and disposal site erosion control measures				
4	Construct temporary launch ramp for dredge and equipment				
5	Install temporary hydraulic pump line(s) from upper pool to Hardy Road landfill property with route generally along riverbed				
6	Install approximately 4 booster pumping stations along the piping route to facilitate sediment movement to the Hardy Road Landfill site.				
7	Prepare landfill "hill" for future material placement. Preparation to include removal and stockpiling of existing clay cap material, installation of a new synthetic landfill liner to isolate "new" soil from the existing landfill waste, modification and protection of the existing methane gas recovery piping system.				
8	Mobilize portable dredge(s) to upper pool. Connect dredge equipment to discharge piping leading to the "landfill" site.				
9	Clear and grub proposed dewatering land area of trees and brush adjacent to and beyond the base of the landfill "hill". This dewatering area needs to be relatively flat for placement and filling of geobags.				
10	Install disposal site piping necessary to fill geobags including manifolds, feed lines, valving, and collection piping				
11	Utilize existing sedimentation basins at the landfill site to collect geobag runoff before flow is sent to a temporary WWTP, or to the Akron's WWTP.				
12	Install temporary pumping system to convey collected geobag runoff from the sedimentation basin to the nearby Akron WWTP or to a temporary WWTP for final treatment.				

13	Install layer of geobags and connect piping feedlines on prepared disposal area. Geobags may need to be stacked to accommodate the small area available for dewatering				
14	Provide and test dredge and piping setup, including final selection of polymer addition makeup needed to accelerate settlement within the geobags				
15	Commence hydraulic dredging operations, pumping sediment and flows to the disposal area. Staff at disposal field to monitor filling of geobags, rate of filling, any needs to adjust piping, and collection of discharge flows.				
16	As geobags become filled, add additional layers of geobags atop lower layers of bags may be required. Geobags sizes may be optimized to fit available work area, but would be approximately 90' to 120' circumference by 200' long.				
17	As geobags become filled, the filled bags will be isolated from new flow and will drain for approximately 3 weeks. After this extended "drying" period, the bags can be split open and the "dry" material removed to the landfill "hill" for spreading and final disposal.				
18	Continue with hydraulic dredging operations with operations; assume to run 24/7, for 6 days/week. Continue filling the geobags and wasting the "dry" sediment as work progresses.				
19	When dredging of the upper pool is complete, dredging equipment and piping is to be demobilized and removed.				
20	When all geobags have been emptied and "dry" sediment has been spread on the "hill", the graded sediment on the "hill" is to be seeded in accordance with BMP requirements.				
	Complete any piping modifications to the methane gas collection system.				
21	Demobilize temporary WWTP, wasted geobags, and all temporary site piping used in the dredging process.				
22	Install any permanent erosion control measures.				
23	Restore any remaining disturbed areas by seeding				
	Remove all temporary erosion control measures				

Table A-7. Construction sequence for Sediment Removal Alternative 2

<b>OPINION OF PROBABLE CONSTRUCTION COST</b>					
<b>TETRA TECH</b>					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Sediment Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Preliminary Sequencing for Sediment Removal			CHECKED BY:	
Mechanical Dredging - Landfill Or Upland Site for Sediment Disposal				CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Mobilization/Demobilization of Equipment Including: 2 Portable Sectional Barges w/Excavators & Crew; 2 Transport Barges; 2 Workboats; 2 Front End Loaders; 2 Dozers; Job Trailer, etc				
2	Erosion Control Measures For Both Offloading Sites Including Maintenance				
3	Mechanical Dredging, Assume 2 Dredge Barges Operating at 1000 CY/Day; 6 Days/Week; 25% Poor Weather Days				
4	Offload Sediment From Barges Onto Off-Road Trucks, Move to Stockpile Area Away From Shoreline to Dewater; 2000 CY/Day Total Using Both Shoreline Areas For Dewatering				
5	Dewater Onshore - Temporarily stockpile spoil to dewater; Move with Dozers or Front End Loaders; Utilize Both North Shore and South Shore Open Areas for Dewatering				
6	Load Trucks For Offsite Disposal From Either The North Shore Parking Lot Stockpiles or Old Power Plant Site Stockpiles				
7	Trucking; Assume Truck To Landfill Property; 35 Mile Haul Each Way Assumed				
8	Approx. Tipping Fee at Landfill, If Other Upland Disposal Site Is Not Located				
9	Restore South Shore Power Plant Property Including Regrading, Replace Fencing, Seeding & Mulch, etc				
10	Remove North Shore Paved Parking Lot Following Dewatering of Sediment				
11	Reconstruct North Shore Bituminous Paved Parking Lot and Base As Necessary				
12	Remove & Replace North Shore Parking Lot Curb & Gutter				
13	Reconstruct Parking Lot Lighting; Salvage and Reset Existing Lighting				
14	Restore North Shore Parking Lot Landscaping Allowance				
15					

Table A-8. Summary of dam removal alternatives

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO.	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Cost Summary For Dam Removal			CHECKED BY:	
	OMRRR Not Included			CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2	Dam Removal Alternative 1	1	LS	\$12,554,000	\$12,554,000
3	Dam Removal Sequence - Demolish and Truck to Crusher for Recycle				
4					
5	Dam Removal Alternative 2	1	LS	\$13,291,000	\$13,291,000
6	Dam Removal Sequence - Demolish & Truck To Landfill for Disposal				
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20	<b>Note: Costs Shown Above Include the Following:</b>				
21	-- Mobilization & Demobilization				
22	-- Bonds & Insurance				
23					
24	--Contingency				
25	--Project Engineering & Design				
26	--Construction Phase Review				
27					
28	<b>Note: Other Project Costs Not Included:</b>				
29					
30	-- Environmental Studies and/or Remediation				

Table A-9. Costs for Dam Removal Alternative 1

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls, Summit County, Ohio			PROJECT NO.:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	[x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL			ESTIMATOR:	RPN
WORK:	Dam Removal Alternative 1			CHECKED BY:	
	Dam Removal Sequence - Demolish and Truck to Crusher for Recycle			CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Mobilize Equipment, Job Trailer, Service Drop, Etc. To Jobsite Following Sediment Removal	1	LS	\$400,000.00	\$400,000.00
2	Install Erosion Control for Office/Barge Launch Area, Allowance	1	LS	\$10,000.00	\$10,000
3	Lower Pool Using Existing Dam Drainline(s)	1	LS	\$2,000.00	\$2,000
4	Mobilize Barge With Hydraulic Excavator and Concrete Breakers for Dam Notching and Begin Dam Concrete Demolition	1	LS	\$500,000.00	\$500,000
5	As Material is Demolished, a Wider Work Area Will Be Created On Top of the Structure. Move Concrete Demolition Equipment to the Top of the Dam and Continue Demolition.	1	EA	\$2,500.00	\$2,500
6	Provide Erosion Control for South Haul Road Area, Allowance	1	LS	\$20,000.00	\$20,000
7	Construct Temporary Haul Road Along the South Shore Within the Former Pond Footprint. Temporary Haul Road to Run Generally from Dam Easterly and Would Ramp Up to Front Street; Crushed Concrete/Aggregate Road Approximately 2000' x 24'	6,300	TON	\$25.00	\$157,500
8	Construct Temporary Cofferdam In Riverbed to Divert River Flow to North Half of Riverbed While South Half of Dam is Removed.	7,050	TON	\$25.00	\$176,250
9	Continue With Demolition Of South Half of Dam. Demolish and Remove Remaining South Shore Foundations and Entire Foundation	13,000	CY	\$275.00	\$3,575,000
10	Remove Existing Wooden Deck Structure From Downstream of Dam On South Shore.	1	LS	\$15,000.00	\$15,000
11	Provide Erosion Control for North Haul Road Area, Allowance	1	LS	\$20,000.00	\$20,000
12	When South Half of Dam Has Been Completely Removed, Construct Temporary Haul Road Using Salvaged Aggregate From South Haul Road Along North Shore. Temporary Haul Road to Run from Dam to the East and Would Ramp Up Near Front Street; Crushed Concrete/Aggregate Road	6,625	TON	\$9.00	\$59,625
13	Remove Temporary Cofferdam Used To Divert Flow To North From Riverbed	7,050	TON	\$17.00	\$119,850
14	Continue With Demolition Of North Half of Dam, Working Generally From Top of Structure. Rubble Falls To Bottom of Structure Along Both Edges. Remove Rubble Using Highway Trucks As Demolition Progresses.	13,000	CY	\$275.00	\$3,575,000
15	Trucking Out Demolition Material to Commercial Concrete Crusher/Recycler; Loading & Trucking. No Offsite Work With Demolition Material Beyond Delivery to Recycler.	26,000	CY	\$13.00	\$338,000
16	Disposal of Non-Concrete Debris to Landfill Using Rolloff Dumpsters (Allowance)	1	LS	\$30,000.00	\$30,000
17	Removal and Disposal of Temporary Haul Road Material	6,625	CY	\$15.50	\$102,688
18	Demobilize from Worksite	1	LS	\$100,000.00	\$100,000
19	Restoration of All Disturbed Areas Including Streambed	1	LS	\$75,000.00	\$75,000
20					
22	<b>Subtotal Construction</b>				<b>\$9,278,000</b>
23					
24	<b>Construction Contingency @ 15%</b>				<b>\$1,392,000</b>
25	<b>Total Estimated Construction Cost</b>				<b>\$10,670,000</b>

28	Project Engineering Design Allowance				\$694,000
29	Project Construction Phase Engineering Allowance				\$800,000
30	Monitoring Program				\$300,000
31	Security Webcams/Public Access Allowance				\$90,000
32					
<b>Total Estimated Project Cost</b>					<b>\$12,554,000</b>

Table A-10. Costs for Dam Removal Alternative 2

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	NC100-CLE-T33987.2
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> CONCEPTUAL <input type="checkbox"/> PRELIMINARY <input type="checkbox"/> FINAL			ESTIMATOR:	RPN
WORK:	Dam Removal Alternative 2			CHECKED BY:	
	Dam Removal Sequence - Demolish & Truck To Landfill for Disposal			CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Mobilize Equipment, Job Trailer, Service Drop, Etc. To Jobsite Following Sediment Removal	1	LS	\$400,000.00	\$400,000.00
3	Install Erosion Control for Office/Barge Launch Area, Allowance	1	LS	\$10,000.00	\$10,000.00
4	Lower Pool Using Existing Dam Drainline(s)	1	LS	\$2,000.00	\$2,000.00
5	Mobilize Barge With Hydraulic Excavator and Concrete Breakers for Dam Notching and Begin Dam Concrete Demolition	1	LS	\$500,000.00	\$500,000.00
6	As Work Area is Demolished, a Wider Work Area Will Be Created On Top of the Structure. Move Concrete Demolition Equipment to the Top of the Dam and Continue Demolition.	1	EA	\$2,500.00	\$2,500.00
7	Provide Erosion Control for South Haul Road Area, Allowance	1	LS	\$20,000.00	\$20,000.00
8	Construct Temporary Haul Road Along the South Shore Within the Former Pond Footprint. Temporary Haul Road to Run Generally from Dam Easterly and Would Ramp Up to Front Street; Crushed Concrete/Aggregate Road Approximately 2000' x 24'	6,300	TON	\$25.00	\$157,500.00
9	Construct Temporary Cofferdam In Riverbed to Divert River Flow to North Half of Riverbed While South Half of Dam is Removed.	7,050	TON	\$25.00	\$176,250.00
10	Continue With Demolition Of South Half of Dam. Demolish and Remove Remaining South Shore Foundations and Entire Foundation	13,000	CY	\$275.00	\$3,575,000.00
11	Remove Existing Wooden Deck Structure From Downstream of Dam On South Shore.	1	LS	\$15,000.00	\$15,000.00
12	Provide Erosion Control for North Haul Road Area, Allowance	1	LS	\$20,000.00	\$20,000.00
13	When South Half of Dam Has Been Completely Removed, Construct Temporary Haul Road Using Salvaged Aggregate From South Haul Road Along North Shore. Temporary Haul Road to Run from Dam to the East and Would Ramp Up Near Front Street; Crushed Concrete/Aggregate Road Approximately 1700' x 24'. Supplement Salvaged Aggregate With 25% New Material	6,625	TON	\$9.00	\$59,625.00
14	Remove Temporary Cofferdam Used To Divert Flow To North From Riverbed	7,050	TON	\$17.00	\$119,850.00
15	Continue With Demolition Of North Half of Dam, Working Generally From Top of Structure. Rubble Falls To Bottom of Structure Along Both Edges. Remove Rubble Using Highway Trucks As Demolition Progresses.	13,000	CY	\$275.00	\$3,575,000.00
16	Trucking Out Demolition Material to Landfill For Final Disposal; Loading & Trucking Approximately 35 Miles Each Way. No Offsite Work Offsite.	26,000	CY	\$23.50	\$611,000.00
17	Landfill Tipping Fee For Disposal of Dam Demolition Material	26,000	CY	\$13.00	\$338,000.00
18	Disposal of Non-Concrete Debris to Landfill Using Rolloff Dumpsters (Allowance)	1	LS	\$30,000.00	\$30,000.00
19	Removal and Disposal of Temporary Haul Road Material	6,625	CY	\$15.50	\$102,688.00
20	Demobilize from Worksite	1	LS	\$100,000.00	\$100,000.00
21	Restoration of All Disturbed Areas Including Streambed	1	LS	\$75,000.00	\$75,000.00
22					
24	<b>Subtotal Construction</b>				<b>\$9,889,000.00</b>

25				
26	Construction Contingency @ 15%			\$1,483,000
27	Total Estimated Construction Cost			\$11,372,000
28				
29				
30	Project Engineering Design Allowance			\$739,000
31	Project Construction Phase Engineering Allowance			\$853,000
32	Monitoring Program			\$300,000
33	Security Webcams/Public Access Allowance			\$90,000
34				
35				
Total Estimated Project Cost				\$13,354,000

Table A-11. Construction sequence for Dam Removal Alternative 1

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> CONCEPTUAL <input type="checkbox"/> PRELIMINARY <input type="checkbox"/> FINAL			ESTIMATOR:	RPN
WORK:	Dam Removal Sequence - Demolish and Truck to Crusher for Recycle			CHECKED BY:	
				CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Mobilize Equipment, Job Trailer, Service Drop, Etc. To Jobsite Following Sediment Removal				
2	Install Erosion Control for Office/Barge Launch Area, Allowance				
3	Lower Pool Using Existing Dam Drainline(s)				
4	Mobilize Barge With Hydraulic Excavator and Concrete Breakers for Dam Notching and Begin Dam Concrete Demolition				
5	As Material is Demolished, a Wider Work Area Will Be Created On Top of the Structure. Move Concrete Demolition Equipment to the Top of the Dam and Continue Demolition.				
6	Provide Erosion Control for South Haul Road Area, Allowance				
7	Construct Temporary Haul Road Along the South Shore Within the Former Pond Footprint. Temporary Haul Road to Run Generally from Dam Easterly and Would Ramp Up to Front Street; Crushed Concrete/Aggregate Road Approximately 2000' x 24'				
8	Construct Temporary Cofferdam In Riverbed to Divert River Flow to North Half of Riverbed While South Half of Dam is Removed.				
9	Continue With Demolition Of South Half of Dam. Demolish and Remove Remaining South Shore Foundations and Entire Foundation				
10	Remove Existing Wooden Deck Structure From Downstream of Dam On South Shore.				
11	Provide Erosion Control for North Haul Road Area, Allowance				
12	When South Half of Dam Has Been Completely Removed, Construct Temporary Haul Road Using Salvaged Aggregate From South Haul Road Along North Shore. Temporary Haul Road to Run from Dam to the East and Would Ramp Up Near Front Street; Crushed Concrete/Aggregate Road Approximately 1700' x 24'. Supplement Salvaged Aggregate With 25% New Material				
13	Remove Temporary Cofferdam Used To Divert Flow To North From Riverbed				
14	Continue With Demolition Of North Half of Dam, Working Generally From Top of Structure. Rubble Falls To Bottom of Structure Along Both Edges. Remove Rubble Using Highway Trucks As Demolition Progresses.				
15	Trucking Out Demolition Material to Commercial Concrete Crusher/Recycler; Loading & Trucking. No Offsite Work With Demolition Material Beyond Delivery to Recycler.				
16	Disposal of Non-Concrete Debris to Landfill Using Rolloff Dumpsters (Allowance)				
17	Removal and Disposal of Temporary Haul Road Material				
18	Demobilize from Worksite				
19	Restoration of All Disturbed Areas Including Streambed				

Table A-12. Construction sequence for Dam Removal Alternative 2

OPINION OF PROBABLE CONSTRUCTION COST					
TETRA TECH					
1468 West Ninth Street, Suite 620, Cleveland, OH 44113			Telephone: 216-861-2950 FAX: 216-861-2960		
PROJECT:	Gorge Dam Removal			DATE:	7/8/2015
LOCATION:	Cuyahoga Falls ,Summit County, Ohio			PROJECT NO:	100-CLE-T33987.2
BASIS FOR ESTIMATE:	<input checked="" type="checkbox"/> CONCEPTUAL <input type="checkbox"/> PRELIMINARY <input type="checkbox"/> FINAL			ESTIMATOR:	RPN
WORK:	Dam Removal Sequence - Demolish & Truck To Landfill for Disposal			CHECKED BY:	
				CURRENT ENR:	
ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1	Mobilize Equipment, Job Trailer, Service Drop, Etc. To Jobsite Following Sediment Removal				
2	Install Erosion Control for Office/Barge Launch Area, Allowance				
3	Lower Pool Using Existing Dam Drainline(s)				
4	Mobilize Barge With Hydraulic Excavator and Concrete Breakers for Dam Notching and Begin Dam Concrete Demolition				
5	As Material is Demolished, a Wider Work Area Will Be Created On Top of the Structure. Move Concrete Demolition Equipment to the Top of the Dam and Continue Demolition.				
6	Provide Erosion Control for South Haul Road Area, Allowance				
7	Construct Temporary Haul Road Along the South Shore Within the Former Pond Footprint. Temporary Haul Road to Run Generally from Dam Easterly and Would Ramp Up to Front Street; Crushed Concrete/Aggregate Road Approximately 2000' x 24'				
8	Construct Temporary Cofferdam In Riverbed to Divert River Flow to North Half of Riverbed While South Half of Dam is Removed.				
9	Continue With Demolition Of South Half of Dam. Demolish and Remove Remaining South Shore Foundations and Entire Foundation				
10	Remove Existing Wooden Deck Structure From Downstream of Dam On South Shore.				
11	Provide Erosion Control for North Haul Road Area, Allowance				
12	When South Half of Dam Has Been Completely Removed, Construct Temporary Haul Road Using Salvaged Aggregate From South Haul Road Along North Shore. Temporary Haul Road to Run from Dam to the East and Would Ramp Up Near Front Street; Crushed Concrete/Aggregate Road Approximately 1700' x 24'. Supplement Salvaged Aggregate With 25% New Material				
13	Remove Temporary Cofferdam Used To Divert Flow To North From Riverbed				
14	Continue With Demolition Of North Half of Dam, Working Generally From Top of Structure. Rubble Falls To Bottom of Structure Along Both Edges. Remove Rubble Using Highway Trucks As Demolition Progresses.				
15	Trucking Out Demolition Material to Landfill For Final Disposal; Loading & Trucking Approximately 35 Miles Each Way. No Offsite Work Offsite.				
16	Landfill Tipping Fee For Disposal of Dredge Material				
17	Disposal of Non-Concrete Debris to Landfill Using Rolloff Dumpsters (Allowance)				
18	Removal and Disposal of Temporary Haul Road Material				
19	Demobilize from Worksite				
20	Restoration of All Disturbed Areas				