

Appendix E – Cost Estimates

**Hoosick Falls Drinking Water Study
Alternative 1 - New Ground Water Supply**

Ground Water Connection Direct Costs						
No.	Item	Quantity	Unit	Unit Cost	Total Cost	
1	Well development and pump testing	2	LS	\$ 100,000	\$ 200,000	
2	Wellhead, pump, and motor install	2	LS	\$ 80,000	\$ 160,000	
3	8" Water Main (Open-Cut)	3,400	LF	\$ 110	\$ 374,000	
4	8" Valves	4	EA	\$ 4,000	\$ 16,000	
5	12" Water Main (Open-Cut on Roads)	11,100	LF	\$ 130	\$ 1,443,000	
6	12" Water Main Bridge Crossing	1	EA	\$ 120,000	\$ 120,000	
7	12" Valves	12	EA	\$ 5,500	\$ 66,000	
8	Connection to WTP	1	LS	\$ 25,000	\$ 25,000	
9	Traffic Control	60	Days	\$ 125	\$ 7,500	
10	Topsoil & Seeding	100	SY	\$ 20	\$ 2,000	
11	Pavement restoration	1,900	SY	\$ 130	\$ 247,000	
12	Flushing Hydrant	4	EA	\$ 7,000	\$ 28,000	
13	Rock removal	200	CY	\$ 200	\$ 40,000	
14	Bendway Weirs	1	LS	\$ 35,000	\$ 35,000	
15	Riprap Armoring	7,000	SF	\$ 7	\$ 49,000	
16	Bioengineered Streambank Protection	16,000	SF	\$ 3	\$ 40,000	
WTP Upgrades Direct Costs (to meet future demand)						
17	Finished Water Pump Upgrades	2	EA	\$ 25,000	\$ 50,000	
18	Chemical System Upgrades	1	LS	\$ 50,000	\$ 50,000	
19	Miscellaneous WTP Improvements	1	LS	\$ 100,000	\$ 100,000	
Construction Subtotal					\$ 3,052,500	
Construction Contingency					30%	\$ 915,750
Total Direct Construction Costs					\$ 3,968,000	
Engineering & Permitting					14%	\$ 555,520
Construction Administration					8%	\$ 317,440
Legal, Admin, Easements					5%	\$ 198,400
Total Indirect Costs					\$ 1,071,000	
Annual Operation & Maintenance Costs (2019 dollars)						
20	GAC Media Replacement			\$ 129,000 per year		
21	GAC System Operator Labor			\$ 11,700 per year		
22	Remote Wellhead Operator Labor			\$ 4,320 per year		
23	Pumping Energy			\$ 34,235 per year		
24	Maintenance of Existing Wells & GAC			\$ 9,360 per year		
25	Groundwater Quality Monitoring			\$ 12,000 per year		
Total Direct and Indirect Costs (Net Present Terms)					\$ 4,990,000	
Total O&M Costs (Net Present Terms)					\$ 1,937,000	
Total Alternative Cost (Net Present Terms)					\$ 6,927,000	

Notes and Assumptions

1. Unit costs presented above are based on recent similar projects and/or construction price indices.
2. Pipe installation rate is assumed to be 200 LF per day.
3. Valves would be placed every 1,000 feet. Flushing hydrants would be placed every 5,000 feet, plus one at each well.
4. Pavement restoration would be required for Village roadways; all other areas would be installed in unpaved shoulder.
5. New wells are estimated to require 8 man-hrs per month above normal operations due to remote location.
6. Present costs includes a 30 year analysis with 2% cost inflation factor and 2.5% discount rate.
7. The new ground water source is assumed to be online at end of year 3, with full capacity GAC in use for interim.
8. Assume GAC replacement every 8 months at \$86,000 until new well source online.
9. During implementation, the full capacity GAC system is estimated to require 5 man-hrs per week at a rate of \$45/hr.
10. Pump electric use is 33 kW, calculated using average flow of 0.44 MGD. Electric rate estimated at \$0.12/kWh.
11. Once alternative is implemented, periodically operating Well 7, microfiltration units, and full capacity GAC system is estimated to require 4 man-hours once per week.
12. GW Quality Monitoring estimate includes lab costs, sampler labor, and annual analysis and reporting.
13. Existing WTP O&M costs are not included in analysis.

**Hoosick Falls Drinking Water Study
Alternative 2 - New Surface Water Supply**

Surface Water Connection Direct Costs						
No.	Item	Quantity	Unit	Unit Cost	Total Cost	
1	Traffic control (10.4 miles)	350	days	\$ 125	\$ 43,750	
2	Jack & Bore RR	2	LS	\$ 200,000	\$ 400,000	
3	16-inch water main (Open-Cut)	63,500	LF	\$ 170	\$ 10,795,000	
4	16-inch water main (HDD)	7,000	LF	\$ 400	\$ 2,800,000	
5	Pavement restoration (2.1 mi)	6,160	SY	\$ 130	\$ 800,800	
6	Hydrant	14	EA	\$ 7,000	\$ 98,700	
7	16" Butterfly Valves	71	EA	\$ 7,500	\$ 528,750	
8	Connection to existing WTP	1	LS	\$ 25,000	\$ 25,000	
9	Topsoil & Seeding	29,200	SY	\$ 20	\$ 584,000	
10	Air release valve Pit	10	EA	\$ 30,000	\$ 300,000	
11	16" Bridge crossing	1	EA	\$ 200,000	\$ 200,000	
12	RW Pump station & Intake Structure	1	LS	\$ 1,750,000	\$ 1,750,000	
13	PRV station	4	EA	\$ 50,000	\$ 200,000	
14	Rock removal	200	CY	\$ 200	\$ 40,000	
15	Coagulant dosing system	1	LS	\$ 50,000	\$ 50,000	
16	Membrane Treatability Pilot Study	1	LS	\$ 75,000	\$ 75,000	
WTP Upgrades Direct Costs (to meet future demand)						
17	Microfiltration Units	8	EA	\$ 12,000	\$ 96,000	
18	Finished Water Pump Upgrades	2	EA	\$ 25,000	\$ 50,000	
19	Chemical System Upgrades	1	LS	\$ 50,000	\$ 50,000	
20	Miscellaneous WTP Improvements	1	LS	\$ 100,000	\$ 100,000	
					Construction Subtotal	\$ 18,987,000
					Construction Contingency 30%	\$ 5,696,100
					Total Direct Construction Costs	\$ 24,683,000
					Engineering & Permitting 14%	\$ 3,455,620
					Construction Administration 8%	\$ 1,974,640
					Legal, Admin, Easements 5%	\$ 1,234,150
					Total Indirect Costs	\$ 6,664,000
Annual Operation & Maintenance Costs (2019 dollars)						
21	GAC Media Replacement			\$ 129,000 per year		
22	GAC System Operator Labor			\$ 11,700 per year		
23	Intake & PS Operator Labor			\$ 10,820 per year		
24	Intake & PS Equipment Maintenance			\$ 40,000 per year		
25	Pumping Energy			\$ 60,560 per year		
26	Maintenance of GAC			\$ 9,360 per year		
					Total Direct and Indirect Costs (Net Present Terms)	\$ 30,967,000
					O&M Costs (Net Present Terms)	\$ 3,451,000
					Total Alternative Cost (Net Present Terms)	\$ 34,417,000

Notes and Assumptions

- Unit costs presented above are based on recent similar projects and/or construction price indices.
- Pipe installation rate is assumed to be 200 LF per day.
- Valves would be placed every 1,000 feet. Flushing hydrants would be placed every 5,000 feet.
- Pavement restoration would be required for Village roadways; all other areas would be installed in unpaved shoulder.
- Air release valves and PRV stations are located based on alignment elevation profile using contour data.
- Present costs includes a 30 year analysis with 2% cost inflation factor and 2.5% discount rate.
- The new surface water source is assumed to be operational at the end of year 4. The full capacity GAC system will be utilized during construction.
- Assume GAC replacement every 8 months at \$86,000 until new surface water source online.
- During implementation, the full capacity GAC system is estimated to require 5 man-hrs per week at a rate of \$45/hr.
- New surface water source is estimated to require 20 man-hrs per month at \$45/hr.
- Pump electric use is 58 kW, calculated using average flow of 0.44 MGD. Electric rate estimated at \$0.12/kWh.
- Once alternative is implemented, periodically operating the full capacity GAC system is estimated to require 4 man-hours once per week.
- Existing WTP O&M costs are not included in analysis.

Hoosick Falls Drinking Water Study
Alternative 3 - Interconnection with Existing Public Water Supply

Interconnection Direct Costs						
No.	Item	Quantity	Unit	Unit Cost	Total Cost	
1	Traffic control (10.1 miles)	480	days	\$ 125	\$ 60,000	
2	Jack & Bore RR	2	LS	\$ 200,000	\$ 400,000	
3	16-inch water main (Open-Cut)	85,500	LF	\$ 170	\$ 14,535,000	
4	16-inch water main (HDD)	9,500	LF	\$ 350	\$ 3,325,000	
5	Pavement restoration (2.1 mi)	6,160	SY	\$ 130	\$ 800,800	
6	16" Valves	95	EA	\$ 7,500	\$ 712,500	
7	Connection to existing water system	1	LS	\$ 25,000	\$ 25,000	
8	Topsoil & Seeding	41,400	SY	\$ 20	\$ 828,000	
9	Flushing Hydrant	19	EA	\$ 7,000	\$ 133,000	
10	Air release valve	10	EA	\$ 30,000	\$ 300,000	
11	16" Bridge crossing	1	EA	\$ 200,000	\$ 200,000	
12	Booster pump station	1	LS	\$ 1,250,000	\$ 1,250,000	
13	Pressure reducing station	4	EA	\$ 50,000	\$ 200,000	
14	Rock removal	3,400	CY	\$ 200	\$ 680,000	
WTP Upgrades Direct Costs (to meet future demand)						
15	Finished Water Pump Upgrades	2	EA	\$ 25,000	\$ 50,000	
16	Chemical System Upgrades	1	LS	\$ 50,000	\$ 50,000	
17	Miscellaneous WTP Improvements	1	LS	\$ 100,000	\$ 100,000	
Construction Subtotal					\$	23,649,300
Construction Contingency					30%	\$ 7,094,790
Total Direct Construction Costs					\$	30,744,000
Engineering & Planning					14%	\$ 4,304,160
Construction Administration					8%	\$ 2,459,520
Legal, Admin, Easements					5%	\$ 1,537,200
Total Indirect Costs					\$	8,301,000
Annual Operation & Maintenance Costs (2019 dollars)						
18	GAC Media Replacement			\$ 129,000 per year		
19	GAC System Operator Labor			\$ 11,700 per year		
20	PS Operator Labor			\$ 10,800 per year		
21	PS Equipment Maintenance			\$ 15,000 per year		
22	Pumping Energy			\$ 62,300 per year		
23	Water Purchase Cost			\$ 320,000 per year		
Total Direct and Indirect Costs (Net Present Terms)					\$	38,477,000
O&M Costs (Net Present Terms)					\$	10,044,000
Total Alternative Cost (Net Present Terms)					\$	48,522,000

Notes and Assumptions

1. Unit costs presented above are based on recent similar projects and/or construction price indices.
2. Pipe installation rate is assumed to be 200 LF per day.
3. Valves would be placed every 1,000 feet. Flushing hydrants would be placed every 5,000 feet.
4. Pavement restoration would be required for Village roadways; all other areas would be installed in unpaved shoulder.
5. Air release valves and PRV stations are located based on alignment elevation profile using contour data.
6. Present costs includes a 30 year analysis with 2% cost inflation factor and 2.5% discount rate.
7. The interconnection is assumed to be operational at the end of year 5. The full capacity GAC system will be utilized during construction.
8. Assume GAC replacement every 8 months at \$86,000 until new interconnection online.
9. During implementation, the full capacity GAC system is estimated to require 5 man-hrs per week at a rate of \$45/hr.
10. New pump station is estimated to require 20 man-hrs per month at \$45/hr.
11. Pump electric use is 59 kW, calculated using average flow of 0.44 MGD. Electric rate estimated at \$0.12/kWh.
12. Cost to purchase water from Troy is estimated at \$1.99 per 1,000 gallons.
13. Existing WTP O&M costs are not included in analysis.

Hoosick Falls Drinking Water Study

Alternative 4 - Continued Use of Public Supply Wells #3 and #7 with Treatment through Full Capacity GAC System

Full Capacity GAC Direct Costs					
No.	Item	Quantity	Unit	Unit Cost	Total Cost
1	Contract 2E (bid result)				\$ 116,285
2	Contract 2H (bid result)				\$ 109,750
3	Contract 2P (bid result)				\$ 21,000
4	Contract 2G (bid result)				\$ 1,298,500
	Full Capacity GAC Construction Costs (already incurred)				\$ 1,545,535
WTP Upgrades Direct Costs (to meet future demand)					
5	Microfiltration Units	8	EA	\$ 12,000	\$ 96,000
6	Finished Water Pump Upgrades	2	EA	\$ 25,000	\$ 50,000
7	Chemical System Upgrades	1	LS	\$ 50,000	\$ 50,000
8	Miscellaneous WTP Improvements	1	LS	\$ 100,000	\$ 100,000
	WTP Upgrade Subtotal				\$ 296,000
	Construction Contingency 30%				\$ 88,800
	WTP Upgrade Construction Costs				\$ 385,000
	Total Construction Costs				\$ 1,931,000
	Engineering & Permitting (assumed) 12%				\$ 231,720
	Construction Administration (assumed) 8%				\$ 154,480
	Legal, Admin, Easements (assumed) 5%				\$ 96,550
	Total Indirect Costs				\$ 483,000
Annual Operation & Maintenance Costs (2019 dollars)					
9	GAC Media Replacement			\$ 129,000 per year	
10	GAC System Operator Labor			\$ 11,700 per year	
	Total Direct and Indirect Costs (Net Present Terms)				\$ 2,414,000
	O&M Costs (Net Present Terms)				\$ 3,916,000
	Total Alternative Cost (Net Present Terms)				\$ 6,330,000

Notes and Assumptions

1. Unit costs presented above are based on recent similar projects and/or construction price indices.
2. Present costs includes a 30 year analysis with 2% cost inflation factor and 2.5% discount rate.
3. Assume GAC replacement every 8 months at \$86,000 until new interconnection online.
4. The full capacity GAC system is estimated to require 5 man-hrs per week at a rate of \$45/hr.
5. Contract 2E included all electrical and communication work for the GAC system, including but not limited to, temp facilities, transformers, wiring, connections, lighting, SCADA, and fire alarm system.
6. Contract 2H included all HVAC work for the GAC system, including but not limited to, fuel tank, boiler unit and pumps, exhaust fans, unit heaters, dehumidifiers, testing, adjusting, and balancing.
7. Contract 2P included all small plumbing work for the GAC system, including but not limited to, site sewer connection, floor drains, and boiler make up water.
8. Contract 2G included furnishing and installing the GAC system, including all work not covered under other contracts, temporary controls, site preparation, foundation, storm drains, metal building, process piping, tanks, pumps, instrumentation equipment and removal of the temporary GAC system.
9. Existing WTP O&M costs are not included in analysis.

Hoosick Falls Drinking Water Study
Alternative 5 - Continued Use of Public Supply Wells #3 and #7 with Treatment through Full Capacity GAC System
and PFOA Remediation through the McCaffrey Street IRM

Full Capacity GAC Direct Costs					
No.	Item	Quantity	Unit	Unit Cost	Total Cost
1	Contract 2E (bid result)				\$ 116,285
2	Contract 2H (bid result)				\$ 109,750
3	Contract 2P (bid result)				\$ 21,000
4	Contract 2G (bid result)				\$ 1,298,500
Full Capacity GAC Construction Costs (already incurred)					\$ 1,545,535
WTP Upgrades Direct Costs (to meet future demand)					
5	Microfiltration Units	8	EA	\$ 12,000	\$ 96,000
6	Finished Water Pump Upgrades	2	EA	\$ 25,000	\$ 50,000
7	Chemical System Upgrades	1	LS	\$ 50,000	\$ 50,000
8	Miscellaneous WTP Improvements	1	LS	\$ 100,000	\$ 100,000
WTP Upgrade Subtotal					\$ 296,000
				Construction Contingency 30%	\$ 88,800
WTP Upgrade Construction Costs					\$ 385,000
Site Remediation Direct Costs					
9	Civil site work	1	LS	\$ 265,000	\$ 265,000
10	Groundwater treatment system equipment	1	LS	\$ 175,000	\$ 175,000
Site Remediation Subtotal					\$ 440,000
				Construction Contingency 30%	\$ 132,000
Site Remediation Direct Costs					\$ 572,000
Total Direct Costs					\$ 2,503,000
				Engineering & Planning 12%	\$ 300,360
				Construction Administration 8%	\$ 200,240
				Legal, Admin, Easements 5%	\$ 125,150
Total Indirect Costs					\$ 626,000
Annual Operation & Maintenance Costs (2019 dollars)					
11	GAC Media Replacement			\$ 129,000 per year	
12	GAC System Operator Labor			\$ 11,700 per year	
13	Site Remediation Operation Costs			\$ 183,000 per year	
Total Direct and Indirect Costs (Net Present Terms)					\$ 3,129,000
O&M Costs (Net Present Terms)					\$ 6,961,000
Total Alternative Cost (Net Present Terms)					\$ 10,090,000

Notes and Assumptions

1. Unit costs presented above are based on recent similar projects and/or construction price indices.
2. Present costs includes a 30 year analysis with 2% cost inflation factor and 2.5% discount rate.
3. Refer to Alternative 4 for Full Capacity GAC cost detail.
4. Assume GAC replacement every 8 months at \$86,000.
5. GAC replacement frequency increases to 10 months at year 6 due to IRM control of PFAS. Replacement frequency increases to a max of 36 months at year 16.
6. The full capacity GAC system is estimated to require 5 man-hrs per week at a rate of \$45/hr.
7. PFOA influent concentrations were assumed to decline from an average of 496 ppt to 40 ppt over a period of 22 years.
8. Site remediation O&M costs include treatment system operation, annual GAC replacement, periodic pump replacement, and power.
9. Existing WTP O&M costs are not included in analysis.